

THE INTEGRATED MACINTOSH

JUNE 1985

\$2.50 in USA • \$2.95 in Canada • £1.85 in UK

POPULAR COMPUTING

A McGraw-Hill Publication

AT&T'S UNIX PC

LAPTOP COMPUTERS:

Special Report &
Buyer's Guide

HARDWARE OF THE MONTH:

NEC's New Laptop
Datavue's Portable
Portable Printers

NCR PC4

WHO'S
CENSORING
YOUR
ELECTRONIC
MAIL?

SOFTWARE OF THE MONTH:

Microsoft's Mac
Business Series:
Multiplan, Chart,
Word and File

Infocom's First
Database:
Cornerstone

Professional
Word Processing:
Xywrite

CONTROL YOUR
COMPUTER WITH
PLAIN ENGLISH
COMMANDS



A SUPERPOWER'S STRATEGIC
ENTRY IN THE BUSINESS
COMPUTING BATTLE



Forty score and seven years ago our fathers brought
forth, upon this continent, a new nation, conceived
in liberty, and dedicated to the proposition that
"all men are created equal."



WORD PROCESSORS AT THE LEADING EDGE™

The Leading Edge™ Word Processor is an incredible breakthrough in price and performance. Priced at \$250 including spelling correction it is clearly the best value in the industry.

Every Leading Edge Word Processor comes not only with a 100% lifetime warranty, but a lifetime of technical support: a no-limit, no-fee, toll free Help Hotline connected to a team of support experts who can walk you through, talk you through, any problem you may ever have.

We've spent almost 5 years, and millions of dollars, in conceiving,

creating, testing, developing and upgrading Leading Edge Word Processing so that it's perfect for you.

And "perfect for you" means you can always get out of it all we've put into it.

Much of which is guaranteed by the people we've put behind it.

Ask your dealer how to get the Leading Edge Word Processor prints (No purchase necessary).

Or how to get the great Leading Edge Word Processing (Purchase, alas, is required).



LEADING EDGE™

The picture in this ad is actually an 18" x 24" collector item—an originally commissioned museum-quality print. This month, the Gettysburg print is yours, absolutely free, at most computer stores that carry Leading Edge Word Processing.

For the name of the dealer nearest you, give us a call
800-343-6833 or, (617) 828-8150

Leading Edge Products, Inc.
Systems and Software Division
225 Turnpike Street, Canton, MA 02021

Leading Edge is a trademark of Leading Edge Products, Inc.

POPULAR COMPUTING

Improving Productivity for Managers and Professionals



What are the headlines		
is the current quote for	Allied	on t
is the option price for	Aluminum Co. of	on t
were the stock prices for	America	on t
is the price/volume info for	Amerasia Hess	on t
is the fundamental data for	American Brands	on t
are the Dow Jones averages	American Can	on t
happened on Wall Street Week	American Home	over
are the estimated earnings for	Products	
is the Disclosure II info for	Anheuser-Busch	
are the headlines	Armco	
concerning the company		
covering the topic of		
in the Economic Update		
in the Wall Street Journal		
in the World Report		
	for each month in	
	for each quarter in	
	for the last 12 da	
	for the last 13-24	
	calls in the month	

RANDOM ACCESS

■ NEWS

Integrated Software Meets the Macintosh . . . Making Portables Readable . . . Comics by Computer . . . IBM Drops the PCjr . . . Observations

■ TELECOMPUTING

On-Line Travel Services: You'll save time and money comparing flight times, air fares, seat availability, and special deals listed on Compuserve, Delphi, Dow Jones News/Retrieval, and The Source.

■ MARKETPLACE

Why Not Buy by Mail?: If you are patient and reasonably knowledgeable about hardware, you'll profit from buying computers and peripherals from mail-order companies. Here are some tips to help you shop wisely.

■ BUSINESS

Communication Is the Key: Microcomputers sometimes encourage office workers to become "information hermits," with disastrous results. Here are three ways to boost cooperation and avoid go-it-alone work habits.

■ AT LARGE

Personal Computers Look Backward: Amateur genealogists go further back faster thanks to new software that can organize their paper files and access such enormous computerized databases as the one at the National Archives.

COLUMNS

■ COMPUTER JOURNAL

Seattle's Slew of Software: Journeying to Seattle and beyond, Steven Levy visits the entrepreneurs who are responsible for the software explosion in Silicon Northwest.

■ MICRO REVOLUTION

A High-Tech Education: Computers can work miracles—even in the struggle to teach kids to read, Jerry Pournelle believes. But only where miracles are expected, are miracles common.

■ MILLER'S TIME

Natural Language Interfaces: New links that let you operate programs and databases with plain-English commands may replace operating environments that use windows, icons, menus, and mice, predicts Michael J. Miller.

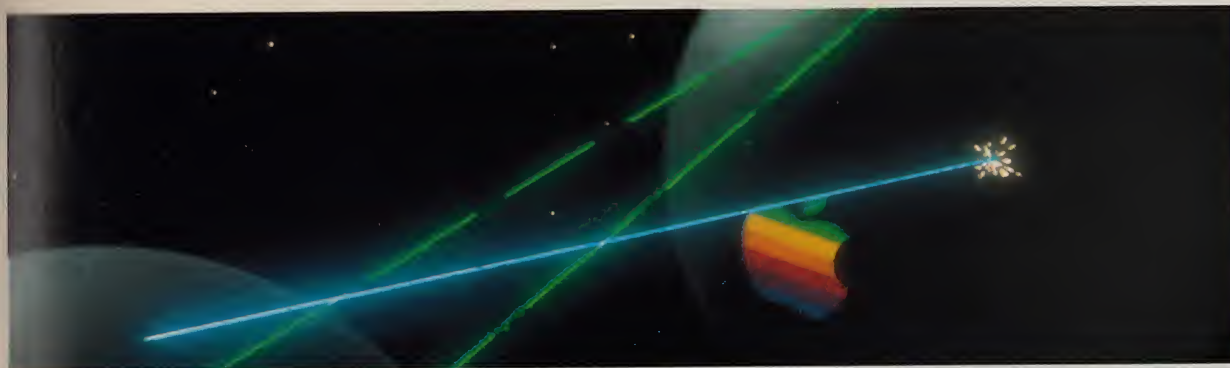
■ THE TECHNOKLUTZ

do you ib'm?: Stephen Banker and the Technoklutz ponder Big Blue's secret plans to branch out into dancing lessons and wonder where it will all lead.

FEATURES

AT&T Escalates the Micro Wars: With the Unix PC now in their arsenal, the generals of AT&T Computer Systems are plotting the strategy to invade the offices of the Fortune 2000 companies.

At Risk: Your On-Line Freedom: Now that telecommunications is commonplace, we face grave questions about privacy, censorship, and criminal liability for electronic mail and other on-line transmissions.



62

SPECIAL REPORT

Laptop Computers: They're tiny, work anywhere, and weigh only 5 pounds. In Part 1 we offer a buyer's guide to these take-along machines, and in Part 2 we preview the fantastic portable displays on the way.

REVIEWS

HARDWARE

The Quadram Datavue 25: Quadram's first computer is also the first battery-powered portable with a 5¼-inch drive and IBM PC compatibility.

The NEC Starlet: This second-generation laptop offers the most power and the largest display of any machine in its class.

The NCR PC4: NCR's new personal computer is IBM PC-compatible with a difference—it's exceptionally easy to use.

The Hush 80 P and Epson P-80: Portable printers the size of a cigarette carton allow you to make hard-copy notes and memos while on the road.

The PG Expansion RAM: Double the memory of your Model 100.

SOFTWARE

Business Series for the Macintosh: Microsoft's Multiplan, Chart, Word, and File work alone or in concert to give the Mac a new corporate status.

Cornerstone: Easy to learn, this powerful menu-driven relational database from Infocom gets the job done fast.

Simply Perfect: If you're running your small business with the aid of an Apple II, this well-integrated word processor and database may be for you.

Xywrite II Plus: Speed and power are the hallmarks of this word-processing program for the IBM PC.

Digital Paintbrush: This graphics toolbox serves both professionals and amateurs.

BOOKS

Customizing the Word Processor: A writer's tutorial shows how to fit the tool to the task.

DEPARTMENTS

ASK POPULAR

NEW PRODUCTS

REACTIONS: LETTERS, READER FEEDBACK, OPINION

On the Cover: AT&T's Unix PC: photograph by David Bishop

68

82

86

90

96

100

104

112

117

120

123

127

131

135

149



68



76

90



Popular Computing (ISSN 0279-4721) is published monthly by McGraw-Hill Inc., with offices at 70 Main St., Peterborough, NH 03458. Office hours: Mon-Fri 9:30 a.m. - 5 p.m., Eastern Time. Postmaster: Send all changes of address to Popular Computing, POB 387, Martinsville, NJ 08836-0387. Address all freight shipments to 70 Main St., Peterborough, NH 03458. Second-class postage paid at Peterborough, NH 03458 and additional mailing offices. Postage paid at Winnipeg, Manitoba, Registration number 9472. Subscriptions are \$15.00 for one year in USA and its possessions. In Canada and Mexico, \$18.00 for one year. In Japan, \$40.00 for one year surface delivery, \$45.00 for one year air delivered. Other foreign countries \$21.00 for one year surface delivery. Single copy price is \$2.50 in the USA and its possessions, \$2.95 in Canada and Mexico, \$4 in Europe, and \$4.50 elsewhere. Foreign subscriptions and sales should be remitted in United States funds drawn on a US bank. Printed in United States of America. Address all editorial correspondence to the editor at Popular Computing, POB 397, Hancock, NH 03449. Unacceptable manuscripts will be returned if accompanied by sufficient first-class postage. Not responsible for lost manuscripts or photos. Opinions expressed by the authors are not necessarily those of Popular Computing. Each separate contribution to this issue and the issue as a collective work copyright © 1985 by McGraw-Hill Inc. All rights reserved. Where necessary, permission is granted by the copyright owner for libraries and others registered with the Copyright Clearance Center (CCC) to photocopy any article herein for the base fee of \$1.50 per copy of the article or any part thereof. Correspondence and payment should be sent directly to the CCC, 21 Congress St., Salem, MA 01970. Specify ISSN 0279-4721/85 \$1.50. Copying done for other than personal or internal reference use without the permission of McGraw-Hill is prohibited. Requests for special permission or bulk orders should be addressed to the publisher.



How to avoid paying your bills.

by Alan Greenspan



Alan Greenspan, Famous Economic Advisor

"The other day, a prominent politician in the executive branch of our government phoned me up.

'Alan,' he said to me, 'the budget is a mess.'

'No joke,' I said.

'Not that budget,' the prominent politician continued. 'My budget. My checkings overdrawn. They're threatening to disconnect my phones. I even got into a shouting match with my wife when I tried to lay off the servants.'

'Civil?'

'Not very. And I think I'm about to be audited. What would I show them? Who keeps receipts for embassy parties?'

At this point, we were disconnected. And although it was too late to teach proper money management to this prominent politician, there is a lesson all of us can learn from his misfortune.

Everyone has to pay their bills, and nobody likes to do it.

You can keep file folders full of bills, drawers stuffed with grocery receipts, envelopes brimming with cancelled checks, and at the end of the month, it still takes hours to figure out just where your money has gone. Not to mention how long it takes to straighten things out at the end of the year.

Well, after years of financial consulting, I've discovered a way to avoid paying your bills: let an Apple® II Personal Computer pay them for you.

There are several advantages to letting an Apple handle your finances.

It will save you time.

It will organize everything.

It will tell you, at a glance,

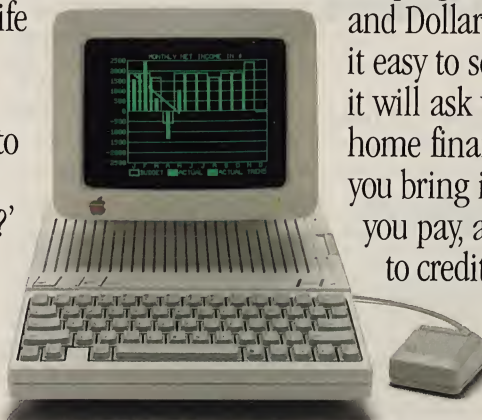
exactly what is going on with your money.

It will pay your bills, and never send you any.

And now, I'd like to turn the page over to those nice people at Apple, who will explain, in their own excruciating detail, just what I'm talking about."

The Apple II and the Home Budget.

With software programs like The Home Accountant™ and Dollars & Sense™, the Apple II makes it easy to set up household books. First, it will ask you some questions about your home finances. Like how much money you bring in each month, how much rent you pay, and whether you owe money to credit card companies, mortgage holders, or any other surly characters. Then, it will ask you to enter some of the bills you receive each month whose prices may vary:



An Apple II will take care of everything from your household budget to your taxes with software programs like Dollars & Sense, The Home Accountant, and Tax Preparer.

phone, utilities, and the like. Then, it will ask you where you keep your money, and for the numbers of your various checking and savings accounts.

That's really all there is to it. After that, an Apple II can automatically write checks for all your fixed expenses each month. It will also tell you what other bills you can be expecting, and when you enter their costs, an Apple II will pay them, too.

An Apple II will see to it that your checkbooks remain balanced, and that you'll know when your expenses are about to exceed your income. It can even help you plan to buy a new car. Or a home.

Or a fur-lined boat, if your budget permits.



With our Scribe® color/graphics printer, you can automatically print out your own checks — not to mention reports, papers, almost anything. Except money.

How to avoid your banker.

After the Apple II writes your checks, it can call your bank with the help of your telephone and an Apple modem. And faster than a teller can say "Next window,

please," you can find out all your balances, enter deposits, see what checks have cleared, transfer money from one account to another, and even pay off some of your credit cards and other bills electronically — without ever writing a check.

So the only time you'll have to go to the bank is when you want to visit with your money, personally.

Which, when done in moderation, we can recommend most highly.

The Apple II and making money.

An Apple II can do wondrous things for your personal finances. With several different software programs, you can become your own stockbroker. Again, by



This is an Apple modem. Not much to look at, we admit, but it does let you pay bills and trade stocks by phone. It also connects your Apple II to a wealth of information services, like THE SOURCESM and CompuServe[®].

using an Apple modem, you'll gain instant access to financial news sources like *The Wall Street Journal*, *Barrons*, and the Dow Jones News/Retrieval[®] service. Find out what they've been saying on *Wall Street Week*. And in most cases, get up to the minute price quotes on over six thousand stocks, options, and other securities.

An Apple II lets you buy and sell securities right in your home or office, at the moment you want to make the trade. It automatically updates your portfolio and gives you detailed holding reports. It even produces charts and graphs, so you can quickly see how you and your investments are doing.

A little tax relief.

If you become perturbed everytime the subject of doing taxes comes up, an Apple II can do them for you with programs like Forecast[™] and Tax Preparer[™].

It can store your records, plan for the next year, and calculate your taxes.

You'll be alerted to payments you've made over the year that may be tax-deductible. It even keeps year-round records, automatically updating totals and making corrections for you. It will even print

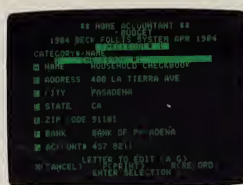
out completed tax forms that the I.R.S. will accept.

And it can do about 10,000 other things totally unrelat-

ed to taxes or this ad. So there's no telling how far an Apple II can take you.

"Well, I think that about covers it. And what if, after all of this, you still have some money left over?

Congratulations. You're doing a lot better than the government."



It can manage your entire stock portfolio with programs like Dow Jones Investor's Workshop[™] and Charles Schwab and Company's The Equalizer[™]. It can even show you what's going on in your bank account.*



*A note to Dr. Greenspan's relatives: He says, "Don't get excited. This isn't my real bank account." © 1985 Apple Computer, Inc. Apple and the Apple logo are registered trademarks of Apple Computer, Inc. The Home Accountant is a trademark of Continental Software. Dollars & Sense and Forecast are trademarks of Monogram. Dow Jones News/Retrieval and Dow Jones Investor's Workshop are trademarks of Dow Jones and Company, Inc. Tax Preparer is a trademark of Howard Software Services. Scribe is a registered trademark licensed to Apple Computer, Inc. THE SOURCE is a service mark of Source Telecomputing Corporation, a subsidiary of the Reader's Digest Association, Inc. CompuServe is a trademark of CompuServe Corporation, an H & R Block Company. The Equalizer and Equalizer are trademarks of Charles Schwab & Company, Inc. Spectrum is a registered service mark of the Chase Manhattan Corporation. For an authorized Apple dealer near you call (800) 538-9696. In Canada, call (800) 268-7796 or (800) 268-7637.

POPULAR COMPUTING

ADDRESS & TELEPHONE DIRECTORY

EDITOR IN CHIEF
PAMELA A. CLARK

MANAGING EDITOR
PHIL LOPICCOLO

ART DIRECTOR
ERIK MURPHY

ASSISTANT MANAGING EDITOR
FREDERIC S. LANGA

EDITORS
DENNIS ALLEN
CATHRYN BASKIN
BEVERLY CRONIN
TOM McMILLAN

EDITORIAL ASSISTANTS
PAT BAUSUM
TERI FARR
JUDY WINKLER

WEST COAST EDITORS
PAUL FREIBERGER
MICHAEL J. MILLER
JONATHAN SACKS
CHARLOTTE EDWARDS, *Editorial Assistant*

COLUMNISTS
STEPHEN BANKER
STEVEN LEVY
JERRY POURNELLE

CONTRIBUTING EDITORS
STEVE CIARCIA
MIKE NICITA
RON PETRUSHA
ROBERT SWEARENGIN
DAN WATT
HARV WEINER

COPY EDITORS
FAITH HANSON, *Chief*
BARBARA MURRAY
DEBORAH NAVAS
B.L. SWEARENGIN

ASSISTANT ART DIRECTOR
ALICE CHEUNG

PRODUCTION
VIRGINIA REARDON, *Director*
MARY JANE FROHLICH
CHERI MCLENON

TYPOGRAPHY
SHERRY MCCARTHY, *Chief*
DONNA SWEENEY
LEN LORETTE
NAN FORMAL
KATHY QUIST

BUILDING SERVICES/TRAFFIC
TONY BENNETT, *Manager*
BRIAN HIGGINS
MARK MONKTON

RECEPTIONISTS
L. RYAN MCCOMBS
CHERYL CASTRO

EAST COAST

EDITORIAL CORRESPONDENCE
POPULAR COMPUTING
POB 397
HANCOCK, NH 03449

EDITORIAL AND BUSINESS OFFICE
70 MAIN STREET
PETERBOROUGH, NH 03458
(603) 924-9281

ADVERTISING/SALES: (603) 924-9281
ADVERTISING/PRODUCTION: (603) 924-7123
EDITORIAL: (603) 924-3851
MARKETING: (603) 924-3424
POST CARD DECKS: (603) 924-6830
PR/MEDIA CONTACT: (603) 924-9027

SUBSCRIPTION REQUESTS OR PROBLEMS
POPULAR COMPUTING
SUBSCRIBER SERVICE
P.O. BOX 328
HANCOCK, NH 03449

WEST COAST

EDITORIAL OFFICES
1000 ELWELL COURT
PALO ALTO, CA 94303
(415) 964-0624

425 BATTERY ST.
SAN FRANCISCO, CA 94111
(415) 362-4600

SENIOR VICE PRESIDENT-PUBLISHER
HARRY L. BROWN

ADMINISTRATION
MICHELE VERVILLE, *Assistant Publisher*
DORIS R. GAMBLE, *Publisher's Assistant*

PERSONNEL
CHERYL HURD, *Manager*
PATRICIA BURKE

ACCOUNTING
DANIEL RODRIGUES, *Business Manager*
KENNETH A. KING, *Assistant Controller*
LINDA SHORT, *D/P Manager*
VICKI WESTON, *Account Manager*
VERN ROCKWELL
JOANN WALTER
DIANE HENRY
MARILYN PARKER
MARIA CAGGIANI
EDSON WARE, *Credit*

MARKETING COMMUNICATIONS
HORACE T. HOWLAND, *Director*
VICKI REYNOLDS
PRISCILLA ARNOLD
STEPHANIE WARNESKY
SHARON PRICE
DOUG WEBSTER, *Director Public Relations*
WILBUR S. WATSON
PATRICIA AKERLEY, *Research Manager*
CYNTHIA SANDS

ADVERTISING/SALES

WILLIAM J. BOYLE, *Director*
CHRISTINE M. LEE, *Assistant*

DISTRICT SALES MANAGERS

NEW ENGLAND (ONTARIO & QUEBEC)
STACEY SHANNON O'ROURKE
(617) 262-1160
575 BOYLSTON ST.
BOSTON, MA 02116

MID ATLANTIC (NY, CT, NJ, WVA, VA, PA, DE, MD, WASH. D.C.)
ROBERT GREGORY
(212) 512-3616
CARI KELLY
(212) 512-2063
1221 AVE. OF THE AMERICAS, 39TH FLOOR
NEW YORK, NY 10020

SOUTHEAST

RICHARD ROBshaw
(305) 724-8454
405 S. BUTLER ST.
MELBOURNE, FL 32901

MID & SOUTHWEST

KEVIN HAROLD
(312) 751-3790
BLAIR BUILDING
645 N. MICHIGAN AVE.
CHICAGO, IL 60611

NORTHWEST

WARD FLOCK/STEVE PHILLIPS
(415) 954-9726
(415) 954-9725
425 BATTERY ST.
SAN FRANCISCO, CA 94111

SOUTHERN CALIFORNIA (UT, AZ, CO, NM)

RICHARD CARPENTER
(714) 557-6292
BUILDING #1, SUITE 222
3001 RED HILL AVE.
COSTA MESA, CA 92626

NATIONAL POST CARD MAILINGS
DAN HARPER

ADVERTISING/PRODUCTION

BARBARA HOY, *Supervisor*
(603) 924-7123
DOUGLAS APELIAN
WAI CHIU LI, *Quality Control Manager*
LINDA J. SWEENEY
MARION CARLSON

CIRCULATION

GREGORY SPITZFADEN, *Director*
ANDREW JACKSON, *Subscriptions Manager*
CATHY DREW
LAURIE SEAMANS
AGNES E. PERRY
LOUISE MENEGUS
JENNIFER PRICE
PHIL DECHERT
MARY EMERSON
SUSAN BOYD

SINGLE COPY SALES

JAMES BINGHAM, *Manager*
LINDA RUTH
CAROL AHO
CLAUDETTE CARSWELL
KAREN DESROCHES

REPRINTS & PERMISSIONS

FAITH A. KLUNTZ
(603) 924-9281

Officers of McGraw-Hill, Inc.: Harold W. McGraw, Jr., Chairman; Joseph L. Dionne, President and Chief Executive Officer; Robert N. Landes, Senior Vice President and Secretary; Ralph J. Webb, Treasurer. Officers of McGraw-Hill Information Systems Company: President: Richard B. Miller; Executive Vice Presidents: Frederick P. Jannot, Construction Information Group; Russell C. White, Computers and Communications Information Group; J. Thomas Ryan, Marketing and International. Senior Vice Presidents: Francis A. Shinal, Controller; Robert C. Violette, Manufacturing and Technology. Senior Vice Presidents and Publishers: Harry L. Brown, Computers and Communications; David J. McGrath, Construction. Group Vice President: Peter B. McCuen, Communications. Vice Presidents: Fred O. Jensen, Planning and Development; Margaret L. Dagner, Human Resources. McGraw-Hill Corporate Offices: 1221 Avenue of the Americas, New York, NY 10020

The Ultimate In-House Accounting Program

Introducing...

In-House Accountant, a powerful general ledger accounting system designed with you in mind.

In-House Accountant provides you with all the tools to fulfill your accounting needs. It's like having a staff of accountants at your finger tips.

Write a check three months ago for the wrong amount?

No problem, the unique editing capabilities of the program will allow you to correct it immediately.

Don't like to read manuals?

Again no problem (even though we think ours is great), extensive on-line help screens are located throughout the program.

Want a built-in mailing list with all the people you do business with?

In-House Accountant provides that too.

Custom Reports?

All that you'll ever want and then some.

Graphics?

We've got them, pie charts, bar graphs and trend analysis.

And, our full color screen will help you stay out of the red.

With all of this flexibility and the power of accounting software costing 3 to 4 times more, you'll be amazed at how simple this program is to use.

suggested
retail

only \$179⁹⁵

PC and PC/XT Compatible

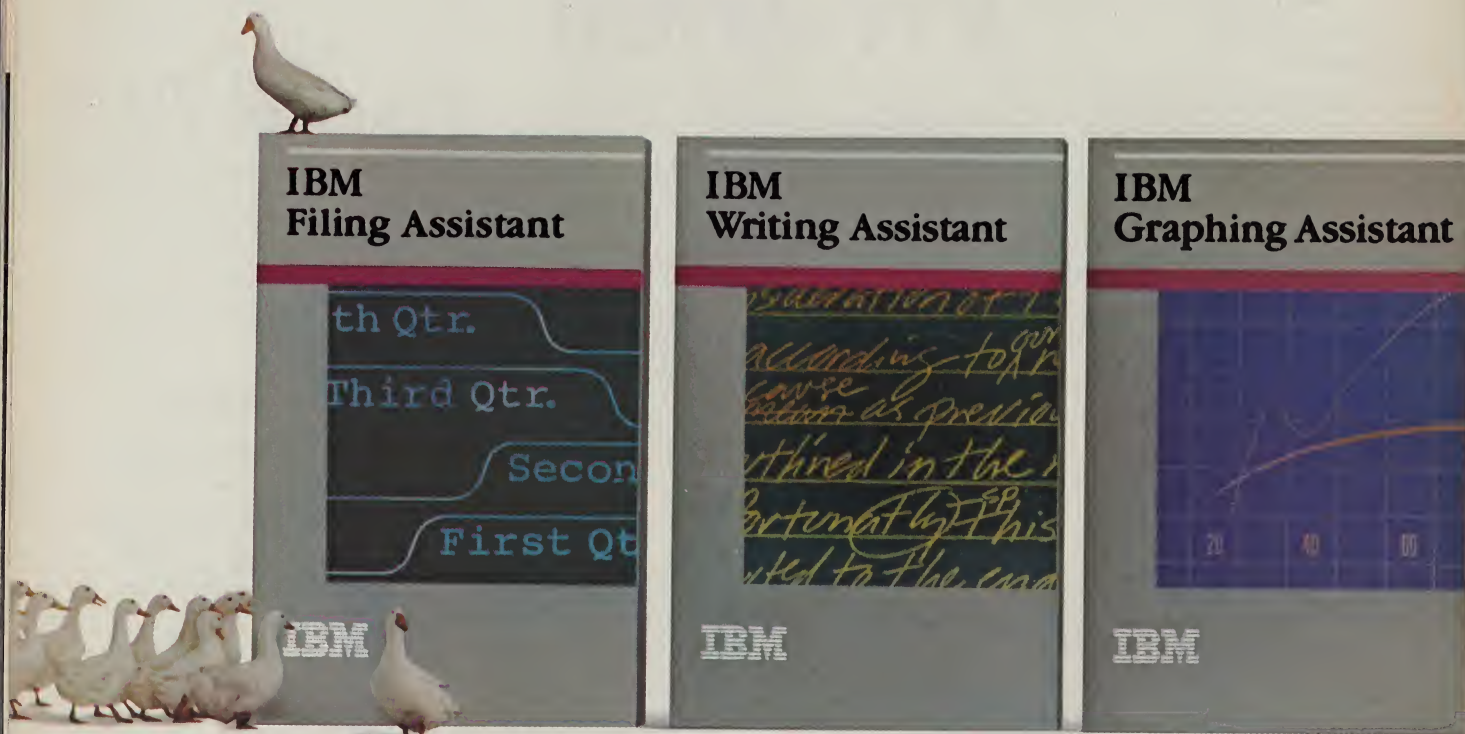
Still not convinced? Then ask your local software dealer for a complete demonstration and see the latest in accounting software.

**The one
accountant
any business
can afford!**

A Comprehensive
Accounting Program.
For Small Business and
Personal Applications

**IN-HOUSE
ACCOUNTANT**

UNITED
SOFTWARE INDUSTRIES, INC.
1880 Century Park East, Suite 311
Los Angeles, California 90067
(213) 556-2211
Inquiry 65



How to get all your

Now you can easily control even hard-to-manage facts and figures with the Assistant Series from IBM.

If you line up the right software, getting your ducks in a row is not only possible, but easy.

There's a program in IBM's Assistant Series to handle each of the most

important jobs people are using personal computers for these days: spreadsheets, word processing and database management.

But unlike software programs that can't share information with other programs, the IBM Assistants work together as a team, as well as alone.

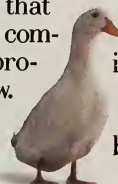
And unlike other programs that can be challenging to learn, all the complicated inner workings of these programs have been hidden from view. So using them is almost intuitive.

Filing Assistant is a database

program that allows you to organize and store information in any format that suits you, and retrieve it instantaneously, according to your own specifications.

Writing Assistant is a word processing program that shows you on the screen just what your words will look like on paper. It helps correct misspelled words and even lets you insert forecasts or graphs from other Assistants into your text.

Graphing Assistant turns numbers into pictures. Like all the Assis-



*IBM Product Center prices.

IBM Planning Assistant

---Qtr 2---	
Forecast	Actual
7,000	7,054
3,500	3,677
9,000	9,032
5,000	4,702
16,000	16,086

IBM

IBM Reporting Assistant

ITEM	EST. V
WIND RING	25,000
INSURANCE	20,000
RETIRED	
TOTAL	46,000
GENERAL AID	3,500
PEAKERS	380

IBM



ducks in a row.

tants, it accepts information from the keyboard, or directly from Filing Assistant. So you can see what the bottom line looks like as a pie chart, a bar chart or a line chart. Or all three. In minutes.

Planning Assistant is a powerful new spreadsheet that replaces complex commands used in earlier programs with plain English (TOTAL instead of C21+D21+E21+F21+G21). It's smart enough to widen columns automatically to fit your entries. It will even fill in the blank after "Dec 85" with "Jan 86."

Then there's *Reporting Assistant*, to

help you create customized reports (complete with totals, subtotals and averages) of your Filing Assistant data.

Every program in the IBM Assistant Series works with every computer, every display and every printer in the IBM Personal Computer family. And each program costs less than \$150.*

Any authorized IBM Personal Computer dealer or IBM Product Center can

give you a demonstration of the Assistant Series. Just seeing them in action may make you feel more organized. For the location of the store nearest you, call 1-800-447-4700. In Alaska or Hawaii, 1-800-447-8090.

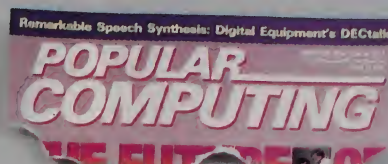
IBM®

Personal Computer Software

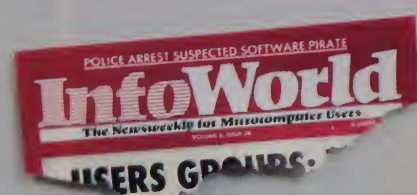
WE ASKED THE CRITICS TO TEAR APART ALPHA'S DATA BASE MANAGER II™



"DBM II offers information managers a file control system as good or better than any other on the market. The documentation with DBM II meets the high standards of all business applications packages from Alpha."



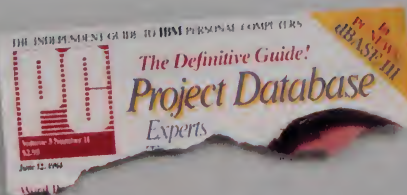
"I used DBM II for about a month. I tried everything I could to get the program to fail, without success. Alpha has evidently anticipated almost every human misuse of the system. Overall, DBM II is an exciting product."



"A product of the future is available today in DBM II. It not only gives you all the features of a typical data base management system, but it also provides you with access to files developed with other programs."



"I recommend DBM II highly. It is well debugged and easy to use. It will work with the bulk of 'other' packages today. You won't have to re-learn your favorite programs with DBM II."



"DBM II must have been developed for business people who want nothing to do with becoming computer literate, and everything to do with easily running business applications. It's so easy you can run a data base within two minutes of booting the disk."



"Sensing the frustration that grows out of having spreadsheets and word processors that don't communicate, and recognizing the need for a data management program for the business computer user, Alpha created DBM II."

We thought you'd like to see the pieces left behind after the nation's leading software critics got their hands on Data Base Manager II—The Integrator.

What they said is what thousands of happy DBM II users have been saying for a long time. It's easy to use, powerful, flexible. And unlike any other data base program you can buy, it lets you instantly integrate files from just about any word processor and spreadsheet program.

So DBM II lets you talk more easily to your computer. And it lets your other computer programs talk to each other. Like WordStar™ to Lotus 1-2-3™. Or Multiplan™ to Multimate™. Or any other com-

bination of programs you like. So reports, form letters, even bookkeeping functions are a snap.

And if the critics thought DBM II was great before, wait until they see our newly updated Version 2.0. It's got all the same easy to use features, and then some.

Like simplified menus so your work goes even faster. Or the fabulous new feature called AlphaKEY™ that lets you pre-program your own data processing routines, and repeat them with a single keystroke.

But the real test is not what we say, or what the critics say. It's what you'll say when you see it for yourself at your Alpha Software Dealer.



ALPHA®
SOFTWARE CORPORATION

If you now own DBM II, call us about our generous upgrade program. 1-800-451-1018, or in (MA) 1-800-462-2016.

Alpha Software Corp. is a registered trademark. © 1984 Alpha Software Corp., Burlington, MA 01803. Lotus 1-2-3 is a trademark of Lotus Development Corp.; WordStar of Micropro; Multiplan of Microsoft and Multimate of Softwood Systems. Permission to publish quotes granted from Respective Publishers. Popular Computing quote from article by Ron Exner, Business Consultant & Freelance Writer.

RANDOM NEWS, BUSINESS, TELECOMPUTING, ISSUES, INDUSTRY, MARKETPLACE, TECHNOLOGY, EDUCATION, PROFILES ACCESS

NEWS

Integrated Software Meets the Macintosh

As Apple continues to push its Macintosh into the office market, software developers are doing their part by introducing a variety of integrated packages aimed at business users.

Lotus Development Corp.'s Jazz has garnered the most prerelease publicity, although other firms such as Microsoft, Hayden Software, and Haba Systems hope to give Lotus a run for its money by offering simpler integrated packages.

Jazz, which will run only on the 512K Mac, combines word-processing, spreadsheet, graphics, database, and communications capabilities—making it by far the most comprehensive package offered for the Macintosh.

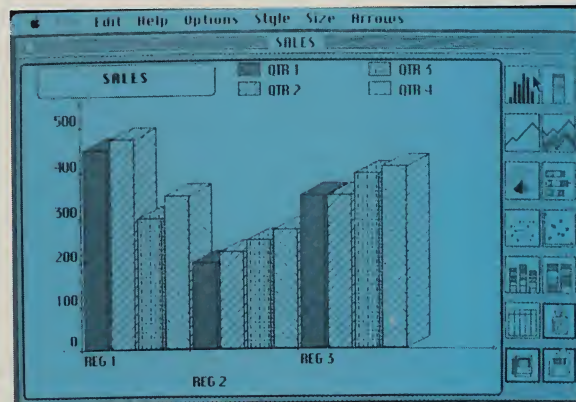
Each Jazz application is designed to offer the features you would expect in a stand-alone program. For instance, the word processor allows you to have two documents open simultaneously and to paste pictures, graphs, or spreadsheet columns into

your documents. The 256-column by 8192-row worksheet has many built-in functions. Jazz also provides six kinds of graphs with presentation-quality output, a form-oriented file manager, and communications software that will handle 1-2-3, Symphony, and Microsoft SYLK files.

Unlike Lotus's Symphony, Jazz uses different data formats for its five applications, all of which can be integrated through a software feature called Hot View. For example, you can use a spreadsheet to prepare a graph for a word-processing document, and when you make changes to the spreadsheet, the program automatically updates the graph in the document.

In March, Lotus pushed the \$595 package's shipping date back two months to late May. Right after Jazz was announced last fall, though, other software firms rose to the challenge and we are already seeing alternatives to Jazz—packages that have fewer applications and

HAYDEN'S ENSEMBLE WILL RUN ON THE 128K MAC.



RANDOM ACCESS

JUNE 1985

features but generally cost less.

Microsoft's Excel offers a powerful yet easy-to-use combination of spreadsheet, graphics, and list management capabilities for the 512K Macintosh. By concentrating on spreadsheet applications, Microsoft is taking a more focused approach. Excel should answer the need for a Macintosh product along the lines of Lotus's 1-2-3.

Excel offers a number of sophisticated features. You can display graphs and worksheets on the screen simultaneously, and changes in a worksheet can be immediately reflected in the graphs. The software allows a huge worksheet—256 columns by 16,384 rows—and can label the rows and columns in either the R1C1 (row 1, column 1) format or the more common A1 (column A, row 1) format.

Excel also includes a macro feature that records your moves on the spreadsheet for automatic repetition later. The program's graphics features let you display or print a variety of sophisticated images, and Excel will accept files created with Multiplan, Microsoft Chart, or Lotus's 1-2-3. The \$399 product is slated to be available in July.

While both Jazz and Excel require the larger RAM of the Fat Mac, owners of the 128K Macintosh need not despair—several less expensive integrated packages are available, albeit with less depth to them because of memory limitations.

Ensemble, which was written by Controle X, a French firm, and is distributed by Hayden Software, has database, graphics, and limited word-processing features. The product is based on a form-oriented file management function with which you can design a page that includes text, numbers, or even pictures. The pictures can be created with Ensemble or brought in from MacPaint.

The program lets you select and sort records as well as perform calculations on the data. Additionally, you can display records in a table format or create two- or three-

dimensional column, area, or pie charts based on the data. Though you can't print the graphs directly, you can paste them into fields in reports to be printed later.

Hayden says the program will also take advantage of the larger 512K Mac, using the extra memory to

65,000 columns and rows.

Macintosh's unusual environment may also spur the development of different modes of integration. For instance, T/Maker has introduced Clickon Worksheet, an \$80 desktop accessory that lets you create spreadsheets or graphs and paste them into other program files.

The 50-row by 20-column spreadsheet includes built-in financial functions, templates for common applications, and a feature that lets you see nonadjacent columns on the same screen.

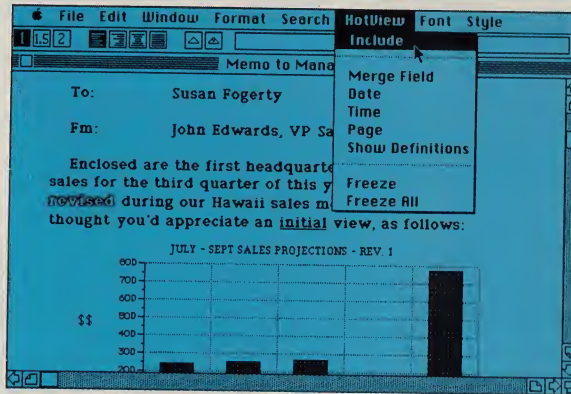
Another answer is offered by Apple's own system called Switcher. Written by Andy Hertzfeld, a member of the original Mac development group, Switcher essentially lets you divide your Macintosh into segments—for example, four sections with

128K bytes of memory in each. You can run a different application in each segment and switch readily from one to another, using the clipboard to move information. Thus, Switcher gives you capabilities nearly identical to what you would have with a multiple-function program in which the clipboard is the only method of integration. Although it was not certain at press time, Apple's Guy Kawasaki, in charge of third-party software support, indicated that Switcher would "likely be licensed to software developers" at no cost.

Several software vendors feel that Switcher may help less complex applications compete against Jazz. For instance, Microsoft suggests you could use it with all four members of its Macintosh Business Series (see review, page 104) or with Excel and Microsoft Word.

All these solutions make the individual functions of several applications available at any time, and they make it easier to combine different kinds of information in the same report. As a result, they offer Apple some needed ammunition in its effort to position Macintosh in the business arena.

—MICHAEL J. MILLER



LOTUS'S JAZZ USES "HOT VIEW" TO MERGE DATA.

work faster. Ensemble, priced at \$299, met its scheduled March shipping date.

Another alternative for the 128K Mac is Haba Systems' Quartet, which offers a fast spreadsheet along with graphics, list management, and limited text editing for annotating spreadsheets and graphs.

Quartet has a 62-column by 999-row spreadsheet and lets you create pie and bar charts and line graphs. Haba Systems says that Quartet will accommodate a larger spreadsheet on a 512K Macintosh. According to the company, the \$199 program was scheduled to reach dealers' shelves at the end of March.

Word-processing, spreadsheet, database, and telecommunications functions will also be available in Infinity, a \$99 package for the 128K Mac created by Matrix/Systems Group.

Originally developed for Atari computers, Infinity lets you display four windows at a time from any combination of its four applications. Because the product uses virtual memory (that is, it stores your working data on disk rather than exclusively in RAM), the firm says it will accommodate a spreadsheet of up to



Clipper gives dBASE III™ users more time to do more. Or less.

Clipper™ allows you to run all dBASE III™ programs 2 to 20 times faster than they do with the standard dBASE interpreter.

That frees up extra time you're wasting if you're running dBASE III programs without Clipper.

Extra time to think. To create. To produce. To use as you choose.

You see, Clipper is the first true compiler for dBASE III. Clipper eliminates the time-consuming translation which the dBASE interpreter performs line after line whenever a program is run.

With Clipper, once you've debugged your source code, it's compiled into more efficient machine code.

And Clipper compiles all your dBASE III programs. The ones you have today. The ones you'll have tomorrow. But don't wait until tomorrow to order Clipper.

Today, Clipper has already been purchased to speed up dBASE run time at 3M and Touche Ross. At Exxon and NASA. In

the Harvard Physics Department. For the State of Arizona and TRW.

And that's just a few of the installations worldwide. From Greece to Venezuela to Canada to Europe.

So stop wasting time.

Call our toll-free 800 number and get Clipper.

You'll spend less time running dBASE III and more time running the rest of your life.

 **Nantucket**™

5995 S. Sepulveda Blvd., Culver City, CA 90230 (800)556-1234 ext. 225 In California (800)441-2345 ext. 225

dBASE III is a registered trademark of Ashton-Tate



We're about to change business views the co

A computer revolution of enormous magnitude is about to take place.

Because Europe's most successful business computer company is now doing business in America. Introducing Apricot. A full line of computers specifically designed for business.

Not adapted to it.

In fact, the facts speak for themselves.

Apricots are elegant and compact 16-bit computers. They employ the MS-DOS operating system, and a minimum of 256K memory. One of our models, the Apricot Xi, boasts an incredible

one Megabyte of memory, and features a Winchester hard disk with 20 Megabytes of storage. We also have models that feature speech recognition, full-size LCD, and icon driven menus.

In addition, you also have a choice between 9" or 12" b/w or 10" color monitors. All of which



change how American computer industry.

have a higher screen resolution than Apple.

And as if that weren't enough, all of our models can be networked from the moment you take them out of the box. They're also capable of running thousands of business software programs specially written for Apricot on 3½ inch disks.

So, if you still think that Apple is a better business computer, look at it from a different perspective.

It's not.

Apricot, Inc., 3375 Scott Boulevard, Santa Clara, CA 95054. Call 800-227-6703, or in California 800-632-7979.



The Apricot Xi. 1Mb RAM. 20Mb hard disk. 720K floppy diskette. MS-DOS. \$4495 (excluding monitor).

apricotTM
We're changing how
American business does business.

June 1985 Popular Computing 15

You can buy a less expensive diskette and not save a thing.

One can understand the temptation to buy a less expensive diskette.

Rather than a Dysan® diskette.

After all, the less expensive diskette is probably almost as good. And should you run into a bad one, well, it didn't cost that much, anyway.

Right? Not quite.

You see, a less expensive diskette is by definition less diskette. And the few pennies you save are worth a great deal less than what you have to lose.

Namely, your data.

That's why it makes more sense to spend a bit more for a Dysan diskette.

Every Dysan diskette you buy will record and retain all your data all the time.

You can be sure of that because every Dysan diskette is certified 100 percent error free and backed by our lifetime warranty.*

So next time you're tempted to buy a less expensive diskette, ask yourself this question.

Can you really afford it?

For the name of the Dysan dealer nearest you, call toll free (800) 551-9000.

Dysan Corporation, 5201 Patrick Henry Drive, P.O. Box 58053, Santa Clara, CA 95050.

Dysan®

**Somebody has to be better
than everybody else.**



* Warranty details are inside every Dysan box.
Dysan is a registered trademark of Dysan Corporation.
© 1985, Dysan Corporation.

Inquiry 33

Making Portables Readable



THE KAYPRO 2000 WITH 25-LINE DISPLAY.

It's no secret that many people consider the liquid crystal display (LCD) screens found on most portable computers to be less than adequate. But recent announcements by several manufacturers of such machines promise some notable improvements.

Morrow Computer has begun shipping its Pivot portable with a new backlit LCD screen that displays white characters on a dark background, a modification that makes the screen much easier to read. Morrow also recently reduced the price of its Pivot models with 16-line displays by \$1000. A dual-drive machine with 256K bytes of RAM now lists for \$1995; a similar machine with 640K bytes is \$800 more. After July 15, owners of the current machines will be able to trade up to a 25-line version for an additional \$1000.

Data General has also made changes to its Data General One, a portable with a full-size 25-line display that has been widely criticized as being nearly unreadable. The screens on new machines will

tilt back so you can adjust the viewing angle to better take advantage of available light. The firm is also using a newer version of the screen, which it says increases the character-to-screen contrast. Although we hadn't seen the new screen at press time, the improvements sound promising. The base price of the Data General One remains at \$2895.

A new entry in the lap-sized portable market comes from Kaypro, the company that made its name with low prices on larger, transportable computers. The \$1995 Kaypro 2000 has a 25-line display, a single 3½-inch microfloppy-disk drive, and 256K bytes of RAM (expandable to 640K bytes). According to the firm, the battery-powered Kaypro

2000 runs most software designed for the IBM PC (if, of course, it's in 3½-inch format).

Finally, Grid Systems has introduced its new Gridcase family of IBM-compatible portables. With 128K bytes of RAM, parallel and serial ports, a 3½-inch drive, and an LCD screen, the Gridcase 1 costs about \$3000. At around \$3200, the Gridcase 2 features an enhanced LCD with blue characters on a yellow background and a wider viewing angle. And for the ultimate in readability, the Gridcase 3 offers a gas plasma display for \$4350. All three boast options such as RGB video output, RAM expansion, and built-in modems.

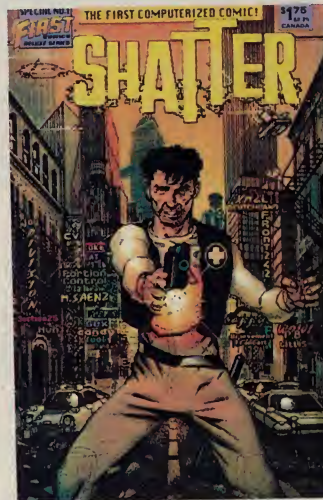
—MICHAEL J. MILLER

Comics by Computer

Holy Disk Drives, Batman! Personal computers are even being used to draw comic books. First Comics Inc. of Evanston, Illinois, has released *Shatter*, the first comic book drawn completely on a personal computer, in this case the Apple Macintosh.

Artist Michael Saenz used MacPaint on a 128K Macintosh to create each page, according to First Comics managing editor Michael Gold. Although "it took a little bit longer" to do the first issue than with the traditional pen-and-ink method, Gold expects computers will eventually be faster than traditional methods because the artist can make changes on the disk rather than on the production boards.

When a drawing is completed, it is printed out on an Imagewriter printer and then colored. Gold says



the firm looked at using the Macintosh to produce the color guides as well but decided against it because of worries about making the color dots register exactly.

In the future, Gold says, the firm would like to experiment both with color and with Apple's Laserwriter printer. "We're very excited" about the possibilities, he adds.

Shatter, the story of a 21st-century police officer in a world where everything is computerized, was created by artist Saenz and writer Peter Gillis. It was initially released as a \$1.75 book-length special edition in March to comic book specialty stores and some computer stores. Gold says the series will continue as a backup feature in First's *Jon Sable, Freelance* for six months and will then be followed by at least one more special full-length issue.

—MICHAEL J. MILLER

Both letter-quality and draft hard copy

Fastest document throughput in its class

Both friction and tractor paper feed

Industry standard serial and parallel interfaces.

Better, more versatile operator controls

TI reliability

Compatibility with third-party and proprietary software

Better, more durable easy-access font modules

The TI 855 microprinter. No other printer says better so many ways.

Feature for feature, no other microprinter can match the versatility, compatibility, reliability and productivity of the OMNI 800® Model 855 microprinter. Here's why.

Two Printers In One. With the TI 855 you get the speed of dot matrix draft copy. Plus the precise clarity of the most advanced matrix technology for letter-quality print. It's two printers in one — at one low price.

A Great Family Name. Texas Instruments is known for providing the world with the industry standard for printers — the TI 810. TI builds the same reliability into every 800 series microprinter. Both the 855 and the data processing Model 850 are part of the expanding TI line of high-performance, low-cost microprinters.

Hardware Compatible. The TI 855 microprinter is compatible with all major PC hardware. And it provides both serial RS232C subset and "Centronics-type" parallel as standard interfaces.

Software Compatible. The TI 855 uses industry standard escape sequences for compatibility with virtually all third-party software. And for those with proprietary software needs, a model is available with ANSI standard escape sequences.

Tough Font Modules For Quick Character Change. Three font modules can be inserted into the front of the printer at one time, and are accessed individually. Each contains both draft- and letter-quality character sets. They're easier to use, more reliable and more durable than traditional metal or plastic daisy wheels.

More Productivity Than Any Other Microprinter. The 855 offers both friction and tractor paper feed, to handle all types of word and data processing applications. A quick-change snap-in cartridge ribbon. Raster and mosaic graphics. And intelligent printing which maximizes document throughput — regardless of format.

Get the printer that makes for better information systems. For more information visit your nearest TI authorized dealer or write Texas Instruments Incorporated, P.O. Box 809063, Dept. DPF-082PL, Dallas, TX 75380-9063. Or call toll-free: 1-800-527-3500.

**TEXAS
INSTRUMENTS**
Creating useful products
and services for you.

IBM Drops the PCjr

The rocky road of IBM's PCjr reached an abrupt dead end this March when the firm announced that it had ceased production of the little tyke in its personal computer family. While the company said it would continue to support the machine by offering cartridge software, memory expansions, and parts, IBM's announcement has been widely interpreted as an admission of defeat in the sagging home computer market.

Less than two years ago, the in-

dustry was buzzing with expectations about the PCjr, then known by its code name Peanut. But the machine faltered coming out of the gate, and consumer response was mild. Rather than wowing anyone with its infrared wireless technology, the Jr's keyboard was roundly condemned for its rubber-topped "Chiclet" keys.

When IBM furnished a much-improved keyboard and eventually slapped what some felt was a predatory price on the PCjr, sales did take off, but apparently profits didn't. Although some pundits suggest that IBM's discontinuation of the PCjr is merely part of a larger plan—indeed, it is very likely that IBM will have another \$1000 computer on the market later this year—the record indicates that Big Blue's dominance in the industry

didn't do much for it in the home market.

In fact, the demise of the PCjr may well signal the end of anything that could properly be called a home market. As Atari vice-president James Copland puts it, "There's no such thing as a home computer. The only difference is price."

By all rights, Apple, Commodore, and Atari should be able to make some gains in the couple of months before IBM gets its ducks back in a row—unless, of course, IBM puts liquidation-sale prices on its remaining stock of PCjrs. According to a study by Future Computing, IBM held an 18 percent market share among personal computer manufacturers selling to homes in 1984.

News and Observations are compiled by West Coast editors Paul Freiburger, Michael J. Miller, and Jonathan Sacks.

OBSERVATIONS

Kaypro Clones AT

Given all the clones of the IBM-PC, it had to happen—hardware manufacturers are introducing machines designed to be compatible with IBM's PC AT. First out of the blocks is the Kaypro 286i. Like the AT, Kaypro's clone is based on a 6-MHz 80286 central processor. The basic unit includes dual high-density floppy-disk drives, 512K bytes of RAM that's expandable to 640K bytes on the main board and up to 15 megabytes with expansion boards, a color-graphics adapter, two parallel ports, and one serial port. The machine has eight expansion slots, five of which are open for such options as modems and additional memory. Bundled with software including Micropro's Wordstar and Infostar, the 286i lists at \$4550, more than \$1200 less than a comparably equipped AT. Other manufacturers are expected to follow suit in coming months.

New Links for Mac

Though Apple may have a head start with its \$50-per-connection Appletalk network, several other firms have announced alternative networking systems for the Macintosh. Corvus's Omninet is faster and allows more users,

but it's four times the cost of Appletalk. Sunol System's Sun*Mac network uses Apple's network protocols but allows the firm's hard disk to be shared by both Macintoshes and IBM PCs. And Touchstone Software now offers MacLine for its Connectables Network, which also includes PCworks for the IBM PC and UniHost for Unix and Xenix systems.

If You Can't Beat 'Em

At least one peripheral manufacturer is reaching out to the low-cost peripheral market served by mail-order firms. Xebec, a disk manufacturer, has set up a mail-order division called First Class Peripherals. Its first product is Sider, a \$695 10-megabyte hard disk for the Apple II Plus and IIe.

Bridging the Gap

Moving documents between systems in an editable form is difficult if not impossible. However, Samna, manufacturer of business word-processing programs for the IBM PC, has announced a solution. Called DART (Documentation Archival Retrieval and Transformation), the system lets users create documents on a dedicated word processor and edit them on a smaller ma-

chine. But it's not cheap—the base software runs \$35,000, and transformation modules are \$15,000 each. Closer to the microcomputer range, Wang now offers software that converts and transfers files between its VS computers and its Wang PC. Called Data Exchange, the program costs \$250 for the PC but also requires a \$1000 partner on the VS.

Everybody's Talking at Me

Several firms are making personal computer communications easier. For the Macintosh, Dow Jones offers Straight Talk, a standard communications package, and Spreadsheet Link, which works with Straight Talk to move data directly into financial models. And Hayes has moved its Smartcom II program to the Mac, adding a special feature that lets you transmit graphics. In the MS-DOS world, Software Publishing Corp.'s PFS:Access program now allows users to send information directly from one computer to another, supports the familiar XModem file transfer protocol, and can be used to set up a computer so that other computers can access files from it. Hayes has also introduced the Transet 1000, a combination print and communications buffer for most computers.

TELECOMPUTING



On-Line Travel Services

*Electronic access to opportunities your travel
agent never mentioned*

It used to be that there were only two ways to make travel arrangements. You could spend hours on the phone checking schedules and shopping for the best fares, or you could turn your plans over to an agent and hope you got the best deal (and probably still spend plenty of time on the phone).

Now there's a third way to plan a trip—with your personal computer, a modem, and a subscription to an on-line information service. Compu-serve, Delphi, The Source, Dow Jones News/Retrieval, and Newsnet all provide electronic versions of Dun and Bradstreet's Official Airline Guide (OAG), which lets you view an up-to-date listing of domestic air fares and flight schedules. Several of the networks offer even more, in-

cluding on-line travel agencies to handle surface travel, special packages, and electronic ticketing.

The OAG is the core of most network travel offerings. Intimidating at first because of its numerous single-letter commands, the Guide offers the more experienced user a wealth of information. It displays one-way or round-trip fares in categories ranging from special budget rates to first class, even listing fare restrictions where they apply. Direct flights are automatically listed for the time you specify, and you can request a list of connecting flights (sometimes they're less expensive).

Once you've selected a potential flight, you can take a more detailed look to find out what kind of aircraft you'll be flying, what meal is avail-

able, and how long the trip will take. For trips involving more than one flight, an expanded listing shows each connection.

Dow Jones provides the Official Airline Guide at no extra cost. Information networks with lower per-hour connect fees charge premiums ranging from Compu-serve's \$32 per hour (\$21 after 6 p.m.) to The Source's \$39.75 per hour (\$34.75 after 6 p.m.). Newsnet charges a flat \$36 per hour regardless of the time of day.

Once you're familiar with the OAG, you can often get all the information you need to book a flight in less than five minutes. The first time you use the system, though, allow half an hour or so to print or record on disk the information found under "How to Use the OAG" (accessed with the "I" command) and to practice. It's worth it in the long run.

You can't make reservations or order tickets through the OAG, but several networks offer further travel services that answer such needs. Perhaps the most useful is Compu-serve's Travelshopper, provided by TWA, which lets you reserve seats on most major airlines once you've filled out a special credit information form. Even if you haven't registered with Travelshopper, you can browse through the TWA listing and check seat availability on the flight of your choice.

Travelshopper also provides international air fares, a feature not yet available from the OAG. Registering with Travelshopper automatically makes you a member of TWA's Bonus Flyer Club, which would tend to make most people consider TWA first when purchasing tickets. Nevertheless, the listings are evenhanded, appearing by fare type rather than by carrier. Like OAG, Travelshopper is a premium service with an extra hourly charge.

Delphi's on-line reservations service was not yet available to the public as of this writing. The main difference between Delphi's prerelease product and the already-active TWA service is Delphi's emphasis on friendliness. User prompts are full

sentences, and the booking process uses only two fare codes: coach and first class. Delphi is to be commended for making booking easier—the standard fare codes are unintelligible to most of us. However, there's no reason why the finished product shouldn't include the full range of fares for each flight.

Another popular travel service is an on-line agency through which you can purchase tickets and get information about modes of travel other than flying. Compuserve and The Source both use standard travel agencies, unrelated to their other travel offerings, that are available either by phone or by electronic mail. The agencies post news of special vacation packages or tours and list the services they can provide. As with Travelshopper, you must complete a special information and credit form if you want to buy tickets either on-line or by phone.

Delphi takes a different approach with its Interactive Office Services (IOS), a thoroughly integrated travel network. IOS accepts all travel requests made on-line and then routes them to the affiliated agency best equipped to handle them. Ticketing and simple requests are sent directly to a central office and processed promptly, but the real difference comes into play on the more unusual requests. If out-of-the-ordinary information uncovered for one client seems appropriate for the general public, it is posted, along with other items of general interest, in an easily accessed database of travel information.

CompuServe, Delphi, and The Source all offer other travel information besides airline fares and flight schedules. CompuServe has the biggest variety, posting everything from State Department travel advisories to a database of private homes, yachts, and vacation cottages for seasonal swap or rent. There's a highway-tour planning service too, although it doesn't appear to threaten AAA's supremacy in that department. A menu item called Travel Fax provides useful information about 12

countries in Europe and the Far East, including business and banking hours, recent currency exchange rates, average monthly temperatures, and business and social customs. Another offering, the Pan Am Travel Guide, provides visa information for various countries and lists disease-infected areas to avoid.

Delphi's wide range of travel ser-

USING the
computer to access
on-line schedules
and shop around,
we were able to save
\$200 over a travel
agent's suggested
round-trip fare.

vices runs a strong second to CompuServe's. The network also offers excerpts from the State Department advisories and pointers on traveling in different countries in a database called Travel Library. This IOS database is one of Delphi's most valuable features. If the information you need isn't already available, an on-line request will elicit a response within 48 hours in most cases. This information is then added to the database for the benefit of other subscribers.

In some ways, Delphi's IOS is still wet behind the ears—the restaurant guide lists only Boston-area eateries, and a section on travel tips for women is an embarrassment. Still, the interactive format and quick processing of ticketing requests make Delphi's service look very promising.

Travel services are new to The Source, and they have gotten off to a slow start. Although it has a thorough restaurant and hotel guide for the U.S. and Canada, on the whole The Source offers less information than either CompuServe or Delphi. Its air schedules are furnished by Dittler Brothers, the people who provide them for airports. The elec-

tronic version is updated more often than the print version, but it is less flexible than the OAG in that it lists only direct flights.

Don't expect on-line travel services to completely replace your local travel agent. You'll still need to be in touch with an experienced travel expert when there's more involved than just getting from one city to another. And it's still a good idea to scan the paper for special tours and air fares before purchasing tickets.

Nonetheless, an on-line service affiliated with a good computer-equipped agency or group of agencies often provides more up-to-date information than local travel agents. Most networks also offer news and weather for the area you're traveling to, which will help you choose the right clothes and avoid strikes or other disturbances.

A somewhat hidden benefit is that an on-line travel service may be more receptive to browsers and window shoppers than the typical travel agency would be. For instance, travel agents in our area were unwilling to find out for us what time of year to visit Austria to see the Lipizzaners and hear the Vienna Boys Choir, but both Delphi's and CompuServe's databases included calendars for Austria that displayed the information we wanted. A request on Delphi brought more details on the Boys Choir within a couple of days. When we asked about traditional Austrian hotels, Delphi posted a list, complete with prices in Austrian schillings, the next day. The results of this search were added to the database and are now available to other travelers.

Another bonus from on-line travel services is the time saved in not having to chase down a travel agent by phone. We once spent an annoying week trying to solve a ticketing problem with a travel agency. Each time one of us called, the agent was out. Whenever she called us, we were out. It took days longer to solve the problem than it would have with an on-line agency.

And finally, whether you purchase tickets from a local agent or from an on-line affiliate, you can really save

money on air fares by perusing the on-line schedules and shopping around. We were able to save \$200 over a travel agent's suggested round-trip fare simply by booking each leg of the trip separately—something a computer buff on his or her own time can easily research.

You probably won't want to sub-

scribe to an electronic information network just to use its travel service. But if you're already a subscriber, take time to sign onto the travel section and see what's available. Traveling will never be the same.

—TAN A. SUMMERS

Tan A. Summers is a freelance programmer and writer living in New Orleans, Louisiana.

MARKETPLACE



Why Not Buy by Mail?

A careful approach eliminates the risks

Of the millions of computers, software packages, and peripherals sold in this country in the last 12 months, relatively few were bought by mail. But buying computer equipment by mail generally saves time and money—so why don't more people do it?

Many people don't because they are temperamentally impatient, and we'd agree that this is an entirely valid reason for sticking with the local computer dealer. Buying by mail simply doesn't offer the instant gratification you get from walking

out of a store with the goods under your arm. If you can't wait two weeks or more to see what you've bought, forget about buying by mail.

A second good reason for *not* buying by mail applies if you aren't familiar with the equipment you want to purchase. Direct-mail companies typically maintain very low overhead costs, and their employees won't spend all day on the phone answering general questions from potential customers. In contrast, the people at your local store should be willing to spend considerable time

educating you, especially if you suggest that it's a prerequisite to a sale.

So to be a confident mail-order buyer, you must have enough hands-on experience with a computer to be sure it's what you want. The same is true of peripherals and software—you must know exactly what you need. Otherwise the service and support offered by an established local computer store will most likely be worth the higher prices that a store will charge.

But fears and false notions also keep people from buying by mail. For example, you might worry about being ripped off. Actually, the chance of having a problem with an established mail-order company is not appreciably greater than with a conventional store. Unreliable outfits tend to go out of business pronto, whether they're retail stores or mail-order firms.

Another false notion is that ordering by mail is a hassle. But think about it. How much of a hassle is it to do all your shopping without leaving your chair and then have the merchandise delivered to your door (or, at worst, to your local post office)? So if fear or just plain inertia is all that is keeping you from ordering your computer by mail, it's time to lick some postage stamps!

Now let's turn to the two big reasons why, if you're well versed and patient, you *should* patronize a mail-order firm. The first, and indeed the main reason for the overall success of mail-order operations, is price. In general, you save at least 10 to 15 percent when you buy by mail, and savings of up to 50 percent off the list price are not uncommon.

A less obvious although equally valid reason for shopping by mail is availability. Supply and demand of computers, and especially of peripherals and software, is quite variable. It is not at all unusual to be able to get an item by mail that no local computer store has or can even obtain. And of course, you can contact many more mail-order houses than there are local stores.

So let's say that you've decided to buy a computer by mail. Before you

A few smart reasons to buy our smart modem:

Features

1200 and 300 baud, auto-dial, auto-answer
 Compatible with "AT" command set
 Can be used with CROSSTALK-XVI or Smartcom II software
 Regulated DC power pack for cool, reliable operation
 Eight indicator lights to display modem status
 Speaker to monitor call progress
 Attractive, compact aluminum case
 Two built-in phone connectors
 Compatible with The Source and Dow Jones News Retrieval
 Unattended remote test capability
 Phone cable included
 Availability

Ven-Tel 1200 PLUS

Hayes

Yes	Yes
Yes	Yes
Yes	Yes
Yes	No
Yes	Yes
Yes	Yes
Yes	Yes
Yes	No
Yes	Yes
Yes	No
Yes	Yes
Now	

\$599

Price

\$499

The Ven-Tel 1200 PLUS offers high speed, reliable telecommunications for your personal computer or terminal. Whether you use information services or transfer data from computer to computer, the Ven-Tel 1200 PLUS is the best product around. Available at leading computer dealers and distributors nationwide.

Also from Ven-Tel: internal modems for the IBM and HP-150 Personal Computers with all of the features of the 1200 PLUS.

You choose. The Ven-Tel 1200 PLUS—the smartest choice in modems.

Ven-Tel Inc.

2342 Walsh Avenue
 Santa Clara, CA 95051
 (408) 727-5721



Crosstalk is a trademark of Microstuf; Hayes and Smartcom II are trademarks of Hayes Microcomputer Products.

Quick doesn't have to

Before Microsoft® Word you had to choose between quick and clean. Producing professional looking documents meant going through draft after draft after draft after draft.

The new Microsoft Word is different. You don't have to practice to make perfect. You can use the full power of the IBM® PC to eliminate the drafts. And give your ideas sudden impact.

Quick quality.

With Word, what you see on the screen is what you'll see on the page. You can preview and design documents. And instantly see the effect of your changes. (No more playing blindman's bluff between the screen and the printer.) Now you can breathe vitality into blocks of lifeless text.

TOO TALL TOYS
NEW PRODUCTS

June to November, 1985

June **EMPIRE STATE BUILDING** \$57.00
Detailed 1/76-scale model has two machine elevators and a battery-powered lighting system. Available with optional climbing King Kong attachment. *bulldozer* *Close up*

July **HIGH SPAN BATHUR BRIDGE** \$65.00
This durable plastic construction kit comes with two wind-up scuba divers for laying underwater cable. Can be easily dismantled or left as a permanent tub fixture. *bulldozer* *Indoor* *Permanant*

August **CONSTRUCTION CRANE** *bold* *Italics* \$32.00
The perfect accessory for any Too Tall skyscraper kit, our crane is battery-operated, swivels 360 degrees, and can be programmed to perform a variety of simple or complex tasks. *Indoor*

September **MOUNT ST. HELENS** *bold* *Italics* \$55.00
Junior geologists will enjoy assembling their own 6-foot tall replica of North America's only active volcano (1). *Supermarket*

October **VINTAGE FIRE ENGINE** *bold* \$77.00
When fully assembled, this large-scale fire engine kit has a riding area 36 inches long and 18 feet, or the height of the top berth on a standard bunk bed. *Indoor that extends to a full*

November **LIVING ROOM SKI LIFT** *bold* \$45.00
Battery-operated with 40 gondolas. Attaches to chairs or dining-room tables with ease (2). *Supermarket*

(1) Available in "before" and "after" versions; please specify
(2) Available in Rocky Mountain or Alpine style.

(2) Available in Rocky Mountain or Alpine style.

TOO TALL TOYS NEW PRODUCTS		
***** June to November, 1985		
June	EMPIRE STATE BUILDING Detailed 1/16-scale model has two working elevators and a battery-powered lighting system. Available with optional climbing King Kong attachment.	\$57.00
July	HIGH SPAN BATHTUB BIDGE This durable plastic construction kit comes with two wind-up scuba divers for laying underwater cable. Can be easily dismantled or left as a permanent tub fixture.	\$65.00
August	CONSTRUCTION CRANE The perfect accessory for any Too Tall skyscraper kit, our crane is battery-operated, swivels 360°, and can be programmed to perform a variety of simple or complex tasks.	\$32.00
September	MOUNT ST. HELENS Junior geologists will enjoy assembling their own 6-foot tall replica of North America's only active volcano ¹ .	\$55.00
October	VINTAGE FIRE ENGINE When fully assembled, this large-scale fire engine kit has a ladder that extends to a full 5 feet, or the height of the top berth on a standard bunk bed.	\$77.00
November	LIVING ROOM SKI LIFT Battery-operated with 60 gondolas. Attaches to chairs or dining-room tables with ease ² .	\$45.00

¹ Available in "before" and "after" versions

² Available in Rocky Mountain or Alpine style.

Their first draft vs. our first draft.

be dirty.



Highlight pithy phrases, flag important words, drive home conclusions. With **boldface**, underline and *italics*, ^{superscript} and _{subscript}. (No more hieroglyphic codes.)

Microsoft Word gets unmatched professional quality from dot matrix, daisy wheel and ink jet printers. And on the new laser printers, it produces stunning results.

It lets you execute commands and edit text faster, with simple keystrokes or the optional Microsoft Mouse. And, **MICROSOFT**® The High Performance Software™ Word has windows so you can have multiple documents on the screen, and you can easily cut and paste between them.

Word also includes a computer-based training disk that gets you up to speed quickly. Plus, a new comprehensive manual.

100% money-back guarantee.

You don't have to take our word about Word. Buy the new Microsoft Word from a participating dealer and if you're not satisfied for any reason, return it to the dealer within 30 days and he'll give you your money back.*

How do we get higher performance out of the PC? Simple, our MS-DOS® operating system tells the IBM PC how to think. And our BASIC is the language spoken by nine out of ten microcomputers worldwide.

So, if you want to clean up your act, act quick. Call (800) 426-9400. In Washington State, Alaska, Hawaii and Canada, call (206) 828-8088. And ask for the name of your nearest Microsoft dealer.

Microsoft and MS-DOS are registered trademarks and The High Performance Software is a trademark of Microsoft Corporation. IBM is a registered trademark of International Business Machines.*Offer good in the United States on IBM PC versions of Microsoft Word purchased on or before August 31, 1985.



2400 bps modems: Do you Really need another speed?

- Is the shift from 300 to 1200 bps going to repeat itself at 2400 bps? The answer is both yes and no. There certainly are applications for 2400 bps asynch dial-up modems, but we shouldn't expect 1200 bps to die overnight.
- 2400 bps modems can improve throughput, thereby getting tasks done quicker and more economically. However, 1200 bps has become the virtual standard for professional dial-up communications, and most users are satisfied with it. So why consider a 2400 bps modem at all?
- One reason is flexibility. If the modem you select operates at all three speeds (300, 1200 & 2400) in accordance with accepted industry standards, it will serve virtually all dial-up applications now and in the foreseeable future.
- The modem you select should be the MultiModem224. It is Bell 212A and 103 compatible at 1200 and 300 bps, and CCITT V.22bis compatible at 2400. It is also 100% compatible with the Hayes command set, meaning that it will work with virtually all communications software packages, at all three speeds. Other features include both synchronous and asynchronous operation, full intelligence and a phone number memory.
- The MultiModem224 is available in both desktop and IBM PC™ internal card versions. (There is also a rack-mounted version for central sites.) And as a bonus, we provide free offers from ten of the most popular on-line information services, including CompuServe™, Dow Jones™ and The Source™.
- A 2400/1200/300 bps modem is just a plain good investment. Why not let the MultiModem224 provide your communications for both today and tomorrow?

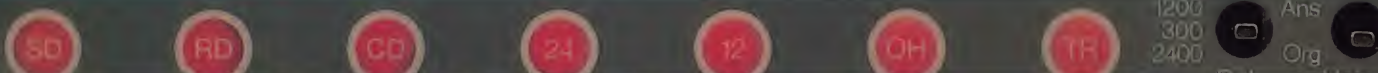
MultiTech Systems 
Inquiry 70

The right answer every time.

82 Second Ave. S.E., New Brighton, MN 55112 (612) 631-3550, TWX: 910-563-3610

MultiTech Systems 

MultiModem 224
2400/1200/300 BPS Intelligent Modem



do anything else, find a store that sells and services the machine you intend to buy. It's a good idea to know and be known by the staff there, because if and when your equipment goes on the fritz, you'll need these people.

Also, it's not a bad idea to discuss the prices of the components you need; maybe you'll get an offer you can't refuse. But don't talk about how much cheaper you'll be getting your equipment by mail. It's the rare retailer who appreciates having his nose rubbed in the fact that he's losing a sale to some outfit operating out of a warehouse with no overhead and prices he can never match.

While you're at the store, pick up the latest copies of a few microcomputer magazines. In fact, it would be useful to have one or two back issues in addition to the current month's. Look for magazines that focus on the computer system you plan to buy; any mail-order firm that advertises in a machine-specific magazine will specialize in supporting that system. Also, the larger general microcomputer magazines are good sources for assembling the number of ads you'll need for comparison shopping.

OK, now you're back home with your computer magazines. You know what you want to buy, and you're sold on the idea of saving time and money. What now?

For maximum efficiency, we'd suggest that you prepare a comparison shopping list. On a lined sheet of paper, mark off a vertical column for each piece of equipment and software package you plan to purchase. Make the first column double-sized—this will be for the name and phone number of each company you call and for notes on method of payment, method of shipment (and additional shipping charges, if any), and guarantee/return policy.

Now go through the latest issues of the magazines and list the firms (as many as you're willing to call, at least) that advertise the product or products you want. Note the page numbers of each ad or clip the ads

so that you'll be able to refer to them readily.

Use some discretion when you choose companies to call. If a firm has run full-page ads in several recent issues, for instance, it's pretty safe to assume that it's a well-established operation. Similarly, if the outfit has a toll-free "800" phone number, you can figure that it means

NEVER send money to a mail-order firm without calling first—the 'latest' ad you have in front of you was prepared several months ago.

business (not to mention the advantage in terms of your own phone bill). This is not to say that all mail-order companies that can afford full-page ads and toll-free numbers are necessarily more reliable than all companies that cannot, but it does improve your odds.

Armed with your list, you are now ready to make some phone calls. And this brings up an important point: never send money to a mail-order company without calling first. Don't forget that the "latest" ad you have in front of you was prepared months ago to make the magazine's deadline. Lots of things—especially prices and what's in stock—can change considerably during the intervening weeks.

Making these calls will take an hour or so, so get comfortable. You want answers to five basic questions from each mail-order firm:

☐ Is the item in stock? If not, forget it and go on to the next company. Sometimes an outfit will tell you that while it doesn't have "Item X" at the moment, it will be "getting a shipment in on Monday, so if you

order it now, you'll be the first in line." Remember what they say about two birds in the bush? It applies in this case—any such offers should be politely declined. Sometimes an enterprising order-taker will try to sell you an alternative product that is in stock. This situation is a good example of why you need to be knowledgeable to buy by mail. Is the alternative an acceptable one? Only you know your needs well enough—and you *must* know the equipment well enough—to make this judgment.

☐ What's the cost of the product you're after? Usually prices are non-negotiable. However, you may find that no one has everything you want, or if someone does, it turns out that the prices are higher than everywhere else. If this is the case, you have some leverage in your choice of what to buy where: "Well, you have the best price on the computer and a competitive price on the disk drive—but your printer price is \$30 higher than at two other places. I definitely want the computer, and if you knock \$30 off the printer, I'll order that and the disk drive and some software from you too." Sometimes it works, sometimes it doesn't.

☐ Will the mail-order firm that has the product you want at an attractive price accept your preferred method of payment? Options can include credit cards, COD, money order or certified check, corporate check, and personal check. (Generally a company will wait two to three weeks to let a personal check clear before shipping.) Sometimes the terms are spelled out clearly in the ad, but not always. Some companies attach a surcharge to credit card purchases. Make sure you're clear on the company's policy for the method of payment you want to use.

☐ How will your merchandise be shipped? The options are United Parcel Service or the regular mail. UPS is faster, but if no one is available to receive the delivery, at best you'll have to trek out to the nearest UPS office, and at worst, the package will be shipped back to the sender. While slower, the regular mail can be more convenient—all you

dBASE III vs

MORE POWERFUL!

dBASE III IS A ***DRAMATIC AND POWERFUL*** NEW BUSINESS PROGRAMMING LANGUAGE.

—Bob Davies, President/STB Corporation

AFTER A TWO-HOUR HANDS-ON SESSION WITH dBASE III, IT IS ***EVIDENT*** THAT ASHTON-TATE HAS MADE A ***SIGNIFICANT*** ADVANCEMENT IN THE TECHNOLOGY OF MICROPROCESSOR-BASED DBMS.

—Robert Dew, Vice President/The Computer Society

RATHER THAN BEING AN ***IMITATOR***, ASHTON-TATE HAS ONCE AGAIN SHOWN ITSELF TO BE AN ***INNOVATOR***.

—Larry Heimindinger/Origin, Inc.

ASHTON-TATE HAS LISTENED TO THEIR USERS. THIS PRODUCT ***ADDRESSES*** EVERY ITEM ON MY ***WISH-LIST***.

—Mark DeVita/National Microware, Inc.

ASHTON-TATE HAS USHERED IN A ***RENAISSANCE***. THE NEXT ***GENERATION*** OF SOFTWARE IS NOW A ***REALITY***.

—Chris MacNeill/Abel Computers

THE NEW REPORT GENERATOR IS ***SUPER*** TO USE AND MODIFY. LABEL GENERATION IS ALSO A NICE TOUCH.

—Michael Broska/Agate Systems, Inc.

dBASE III™ is the powerful and easy-to-use relational database management system you've been waiting for. You can use it without hesitation whether you're a beginner or an expert.

The big winner in the easy-to-use vs. more powerful controversy is you.

If you want to know all about dBASE III, come to your Ashton-Tate software dealer for a free demonstration. For more information call (800) 437-4329 ext. 2311 or in Colorado call (303) 799-4900 ext. 2311.

S. dBASE III

EASY TO USE!

dBASE III IS BY FAR THE *EASIEST*, MOST *COST-EFFECTIVE* WAY TO MANAGE A LARGE DATA BASE.

—Robb Auspitz/McEntyre Designs

dBASE III IS MUCH *EASIER* TO OPERATE AND UNDERSTAND. PROGRAMMING WITH IT IS A *BREEZE*.

—Michael Broska/Agate Systems, Inc.

THE NATURAL CHOICE OF THE NOVICE USER WITH EXPANDABLE NEEDS. dBASE III IS REALLY *EASY TO USE!*

—Alex Gersen/Alex Systems

dBASE III SUCCESSFULLY COMBINES THE FEATURES OF A *POWERFUL* DATABASE MANAGER WITH THE SIMPLICITY AND USER-FRIENDLINESS OF A FILE MANAGER. IT SETS THE STANDARD AGAINST WHICH ALL OTHERS WILL HAVE TO BE *COMPARED*.

—Jerry Schneider, Vice President/WBS & Associates

ASHTON-TATE HAS *OBVIOUSLY* LISTENED TO THE END USERS.

—Dave Browning, Chairman/
Database SIG, Capital PC Users Group

THE DEGREE OF RESPONSIVENESS WHICH ASHTON-TATE HAS SHOWN IN ITS *WILLINGNESS TO LISTEN* AND ADAPT TO USER *NEED* SHOULD GUARANTEE IT A COMMITTED FOLLOWING IN THE MICROCOMPUTER COMMUNITY.

—Phillip Wood, Director of Data Processing/Search Institute

Software from

ASHTON-TATE™

We'll put you in control.

have to do is go to your local post office to pick up your package. Many companies tack on shipping charges, and some won't ship COD. Make sure you pin down these details.

□ What sort of guarantee does the company offer, and what happens if you have to return a defective product? There are almost as many guarantee policies as there are companies. Some offer the manufacturer's warranty only, some offer their own for some period of time, and sometimes it's just caveat emptor. The basic questions are under what circumstances and for how long can you return the merchandise for a refund and whether there is a restocking charge.

Having these questions answered to your satisfaction will prevent most potential problems, but if something does go wrong, remember your rights. According to Federal Trade Commission regulations, within 30 days of receipt of your payment, the mail-order company must either deliver the goods, send you a notice explaining the delay and offer you the option of a refund, or refund your money. If the company takes the second option and you elect to give it more time, the 30-day provision begins again from that date. If a company fails to meet these requirements, you should file complaints with both the FTC and the U.S. Postal Service.

As long as you know what you want, buying your computer by mail should save you money and effort. And, especially if you follow the advice we've outlined here, the chances of something going wrong are quite remote. Since 1981, we have ordered from more than a dozen different computer mail-order companies. Net result: zero complaints, one refund required, several hard-to-get items obtained, good service received, and thousands of dollars saved.

—BRAD HESSEL AND
REDMOND SIMONSEN

Brad Hessel and Redmond Simonsen have been designing software for and writing about microcomputers since 1980. They are partners in the New York design firm Redmond Simonsen Associates.

BUSINESS



Communication Is the Key

*As long as micro users are office hermits,
the fruits of their labors will go to waste*

Business microcomputers and powerful software packages have radically altered the typical corporate environment in the past three years. Mainframe computers in traditional data-processing departments no longer have absolute control over the information that is every company's lifeblood; for many managers, the word computer now means the powerful, friendly tool on the desk rather than the intimidating creature served by white-coated specialists.

So what else is new, you say. We've all heard about the personal computer's dramatic effect on the office. But the revolution occasioned by the personal computer is far from over. While we are finding solutions that never would have been developed under the old arrangement of centralized data processing, we are also encountering new problems. Chief

among these is the fact that personal computers tend to promote hermit-like work habits, which in turn leads to duplication of effort, lack of communication of successful applications, and, in extreme cases, lapses of corporate security.

Success for any business organization depends on cooperation and communication. An individual manager may develop a wonderful way to forecast sales using a personal computer, but if the data and results can't be shared by other managers, benefits for the company are limited. As long as personal computer users are information hermits, unable to share their insights and resources, the fruits of many of their labors will go to waste.

The answer, of course, is commu-



THE AT&T PC. THE COMPUTER WITH THE FUTURE BUILT IN.



Before you buy a personal computer for your business you should ask yourself two essential questions. One: What do you need today? Two: What will you need tomorrow?

The AT&T PC 6300 is the answer to both. Today, you'll get a high performance computer that's competitively priced. A computer that not only runs the broadest selection of software available, but has the power and speed to make the most of it. A computer with superb graphics in monochrome or color. And a high resolution screen that's easy on the eyes.

For tomorrow, you'll get a computer with the future built in. With its modular architecture and seven expansion



sion slots, it's ready now to work with future technology, and meet your future needs. From additional power to multi-tasking capabilities, even to features yet to come, it can be easily enhanced as time goes by.

That's a commitment from AT&T. And the AT&T PC, the computer with the future built in.

For more information, call your AT&T Account Executive, visit an authorized AT&T dealer, or call 1-800-247-1212.



AT&T
The right choice.

*Give people the tools they need,
and there is no limit to what they achieve.*

*Announcing the first major
breakthrough in word processing
technology since WordStar.*

*Now, state-of-the-art
comes easy.*

Introducing WordStar 2000, a totally new word processing program from the makers of WordStar.

WordStar 2000 removes all limits from word processing. From what you can create. From what you can achieve.

Because WordStar 2000 lets you do everything.

Easily.

From windows, to undo, to spelling correction, WordStar 2000 is the complete business word processor. And more.

WordStar 2000 gives you the works.

"Windows" allows you to work on different documents—simultaneously. "Undo" lets you replace text you mistakenly removed. A built-in spelling corrector checks and corrects misspellings from over 97% of the most commonly used words.

WordStar 2000 also has a "typewriter mode" to fill in forms or envelopes easily. Plus "format sheets," which give you ready-made headings, tabs and margins at the touch of one key. It can even insert frequently used text with a simple command.

Finally, a truly integrated word processing system.

WordStar 2000 goes well beyond words.

It comes with a built-in spelling corrector. Five-function math. A built-in mail merge enables you to mass produce form letters. Get our special Plus package and you also get a built-in mail list data base that allows you to create, update and sort your own mailing lists. Also a built-in indexer. Not to mention built-in telecommunications capabilities.

WordStar 2000 can also read files from other major software products, such as Lotus 1-2-3® and D-Base III®.

**WordStar 2000 is so easy,
you'll save on time, training—
even temps.**

With WordStar 2000, the keys you press are the keys you'd expect to press ("c" for copy, "p" for print, etc.), so they're easy to remember. You may also use function keys. Uniquely designed menus give you easy access to all features. And



MicroPro's exclusive "tutor-in-your-computer"™ makes learning fast and fun.

WordStar 2000 is therefore ideal for standardization in the office. Computer-shy managers use it fast and fearlessly. Secretaries master its power and versatility in record time. Temps become more productive more quickly.

And whether you buy WordStar 2000, original WordStar or WordStar for PCjr, MicroPro will continue to support it by keeping pace with the latest advances in hardware technology. If you already have original WordStar, you may wish to take advantage of our special WordStar 2000 upgrade program. It's easy and inexpensive, and WordStar 2000 allows you to transfer WordStar files to or from WordStar 2000 with just a few simple keystrokes.

Call your local MicroPro dealer, or call MicroPro for the dealer nearest you at (800) 227-6703 [in California (800) 632-7979] today.

So you can remove all limits from what your company can achieve.

Now available for IBM PC®/AT®/XT® and compatibles with 256K RAM. Upgrade from WordStar to WordStar 2000 through your dealer. Call MicroPro Customer Update (800) 227-5609, 9am-3pm P.S.T.

WORDSTAR®
2000

Now there are no limits.™

MicroPro.



BY THE YEAR 2000, THE WORLD MAY CATCH UP WITH THE WAY COMPUSEVE'S ELECTRONIC MALL™ LETS YOU SHOP TODAY.

Presenting the computer shopping service that delivers discount prices, name-brand merchandise, and in-depth product information.

To make your computer even more useful, join CompuServe and shop in our Electronic Mall. Easy enough for beginners, it's open 24 hours a day, 7 days a week. And it offers a wide range of goods and services from nationally known stores and businesses including Bloomingdale's, Waldenbooks, American Express and Commodore.

CompuServe's Electronic Mall™ lets you shop at your convenience in all these departments:

The Auto Shop, Book Bazaar, Financial Mart, Leisure Center, Merchandise

Mart, Newsstand, On-line Connection, Personal Computer Store, Record Emporium, Specialty Boutique and Travel Agency.

Take the CompuServe Electronic Mall 15-Minute Comparison Test.

What you can do in 15 minutes shopping the Electronic Mall way.

- Access descriptions of the latest in computer printers, for instance.
- Pick one and enter the order command.
- Check complete descriptions of places to stay on your next vacation.
- Pick several and request travel brochures.
- Access a department store catalog and pick out a wine rack, tools, toys...anything!
- Place your order.

What you can do in 15 minutes shopping the old way.

- Round up the family and get in the car.

The Electronic Mall—A Valuable Addition to the Vast World of CompuServe.

CompuServe Information Services bring you information, entertainment, personal communications and more.

You can access CompuServe with almost any computer and modem, terminal or communicating word processor.

To buy a CompuServe Subscription Kit, see your nearest computer dealer. To receive our informative brochure, or to order direct, call or write:

CompuServe

Information Services, P.O. Box 20212,
5000 Arlington Centre Blvd., Columbus, OH 43220
800-848-8199
In Ohio call 614-457-0802

nication between personal computer users and between the machines themselves. But as obvious as this solution is, it has not been implemented fully because of confusion about methods and lack of cooperation. To help you understand the options, let's look at three different (but potentially complementary) approaches to business microcomputer communications: the information center, the local network, and the departmental computer system.

Initially promoted by IBM, the information center concept relies on mainframes as the organizing center for all company computing. Because of this centralization, the information center approach is popular among traditional data-processing groups. But it goes beyond the old-style DP department in that it aims to provide the best resources throughout the company, including support of personal computers.

Unless the information center is more than just a renaming of the traditional data-processing department, though, the potential contributions of personal computer users will be minimized. Those managers and professionals who are not conversant enough with computer technology to make use of mainframe capabilities are exactly the ones who often make the most creative use of personal computers, and the organization and resources of the information center must be flexible enough to allow and even encourage exploration and experimentation in a nonintimidating atmosphere.

Another potential limitation of the company-wide information center is the usual corporate ambivalence about making information available throughout a company. A clearly defined set of procedures is needed to make centrally stored records as accessible as possible while at the same time guarding against unauthorized access and inadvertent damage to files.

In short, the information center represents an effective approach to today's company computing requirements only when it caters to the needs of the business managers

and professionals in the organization. The information center should assist them in purchasing and using personal computers while also offering full access to centrally stored data. Often this involves hiring new information center workers who, because they are unencumbered by existing DP attitudes and methods of work, can help the center serve a

NETWORKS
are effective only
when used to
capacity, and that
won't happen as long
as old methods of
communication
persist.

broader base of users.

A second approach to integrating the personal computer into a company-wide system is the local network. In such a network, personal computers are interconnected with appropriate hardware so that they can access mainframe files, communicate via electronic mail, and share peripherals such as high-quality printers and file servers. At the same time, each desktop machine functions as a fully independent unit.

The local network sounds like the answer to everyone's prayers, but use of such systems has developed more slowly than the computer industry expected. Networks are neither cheap nor simple to install, but a bigger reason for their slow growth is that business people typically adopt new computer techniques only when their value is immediate and obvious. A network serves its purpose only when it is used to capacity, and that will not happen while old methods of communication persist.

The third way of answering the need for communication between

business people using personal computers is with a departmental computer system. This is perhaps the most radical approach, for it bypasses traditional company-wide procedures and focuses on the needs of specific work groups. But departmental-level business computing offers several distinct advantages.

First of all, by employing a multiuser system with a number of terminals connected to a central processor, a departmental computer system has many of the same advantages as the local network—especially in terms of sharing files and peripherals. But unlike company-wide systems in which a variety of needs must be answered, the departmental computer can be dedicated to the more specific common needs of a small group of workers. Also, multiuser implementations are often less expensive than stand-alone micros on every desk.

Moreover, a departmental computer system sidesteps the difficulties of working through a central DP group. Users feel less intimidation because they're working with their own colleagues, and the creativity that occurs on the individual level is more likely to be shared. The changeover to electronic communications is easier on a smaller scale, and security of files is rarely as big a concern when only the members of a single department have access to them. At the same time, the multiuser departmental system can tie into a central mainframe or outside communications link to tap those resources.

But perhaps the most important point of all is that these approaches are all variations on the same theme: the future of the personal computer in business lies in connection and communication.

There is no contradiction in the basic technology of the information center, the local network, and the departmental computer. All three can coexist in a single company. The mainframe-based information center can guard the company's central files, departmental computers can organize and increase the produc-

tivity of more specialized operations, and a network can pull together all of the firm's computer resources.

Personal computer use by business professionals is still in its pioneering stage. This is the time to en-

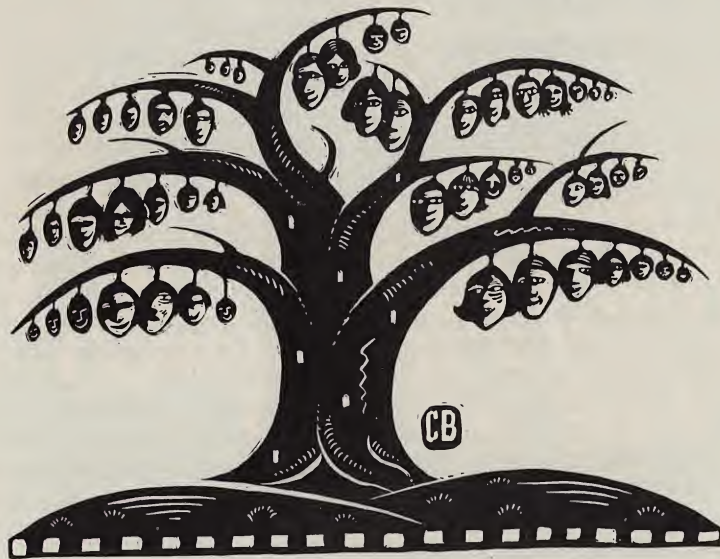
courage the enthusiasm generated by the machines, not to stifle it.

—HOWARD FALK

Howard Falk, author of *Microcomputer Communications in Business* (Chilton, 1984), is a consultant based in Montclair, New Jersey.

AT LARGE

Personal Computers Look Backward



Amateur genealogists use today's technology to illuminate the past

Instead of bringing a hot covered dish to family gatherings, Bill Johnson carries his Heath/89 computer, his NEC daisy-wheel printer, and his ROOTS/89 software.

"My wife's family has many reunions for different branches of the family every year," explains the bearded high school teacher from Manassas, Virginia. "I haul the computer everywhere—to Kentucky for a reunion of one branch, to Ohio for a reunion of another branch. People come up to me and say, 'How

am I related to so-and-so?' I pull up their names from the database, and with one keystroke I can show them that they are third cousins, twice removed, or whatever."

Often one of Johnson's relatives will ask for a copy of his or her family tree. Johnson simply punches in the relative's name and within minutes provides a comprehensive personal genealogy chart, which on some lines Johnson has traced back to the 1500s. "Lots of times they look at the chart and realize that they can

add some information to it, some name or date that helps me improve my records," Johnson says.

As a serious amateur genealogist (he is director of the Computer Interest Group of the National Genealogical Society, 1921 Sunderland Place NW, Washington, DC 20036) Johnson has lots of company. Today there are nearly 2000 genealogical societies, with a collective membership of almost three-quarters of a million. Ironically, the pursuit of the past, which conjures up images of scholars poring over old records in musty attics, has in the last three years been transformed into an electronic historical quest.

This explosion of interest comes from a group of individuals of whom many are in their sixties or seventies and usually thought to be leery of the computer age. But Johnson has seen the evidence with his own eyes. The 1982 annual meeting of the National Genealogical Society marked the first time that genealogical software packages were readily available. At that meeting, Johnson recalls, "Some people were interested in computers but not interested enough to really spend money."

At the 1984 meeting, Johnson found that "there was just no holding them back. They had computers, they knew how to use them, and they asked intelligent questions."

The reasons for amateur genealogists' enthusiasm about personal computers are pretty obvious. If you traced all of your ancestors back only 200 years, you would have about 16,000 names to catalog. Some professional genealogists and family associations have as many as 50,000 names on their ancestral trees. We're talking *data* here.

So the primary task for a personal computer running a genealogy program is to organize all the data. Most of the 55 genealogical software packages on the market today concentrate on this function. Johnson uses the ROOTS/89 program from Commsoft, but he notes that most of the other programs designed for amateur use are similar.

When fed any name in the database, Johnson's computer will spin out a four-generation ancestral chart, the key worksheet for any genealogist. The chart traces a person's lineage back to great-great grandparents, each of whom is keyed to another chart.

A current limitation of most amateur genealogical software is its inability to merge files. If, for example, Johnson should happen to encounter a computerized genealogist whose great-grandfather was also Calvary Bias of Logan County, West Virginia, he would like to be able to merge the other genealogist's data about this common distant relative with his own. Such powers will probably come soon, but as of now the two would have to swap hard copies and enter the new data into their own files separately.

Amateur genealogists may be excited about the convenience and power personal computers offer today, but they really get carried away about the future, when they will be able to tap into huge databases with their machines.

As Johnson explains, such developments will revolutionize amateur genealogy. "Some of my ancestors arrived in the U.S. from Germany in the 1880s during a huge wave of immigration," he says. But right now, he's unable to trace the records because they're "buried somewhere in 130 massive rolls of unindexed microfilm at the National Archives."

The National Archives is a mecca for genealogists. In all, several *billion* pages of written material are on file there, along with 5 million photographs, 82,000 rolls of motion picture film, 70,000 recordings, and 4 million maps, charts, and aerial photographs. We're talking *mega-data* here.

"You will never finish using the resources of the National Archives in your lifetime," says Johnson. "There is so much there that deals with your family. Everything that the government has had its finger in is represented. If people came through the Port of New York, Customs is going to have records. If

your ancestor was in this country during the Revolutionary War, chances are he was involved." The Archives has military records stretching back to the Revolution and also houses the U.S. Census records, theoretically containing the names, addresses, and family data for every man, woman, and child who has lived in America since 1790.

ON their own, individual genealogists and small firms are computerizing bits and pieces of data from the National Archives.

But searching these incredible files can be impossibly difficult. Much of the material is handwritten and haphazardly indexed. While the genealogist of the future may be able to access all this information via modem, today the task is not so easy. To be sure, all new information at the Archives is put into a centralized database, but present-day data is of little use to the genealogist. (Furthermore, because of privacy laws, it will be 72 years before today's data is open to the public.)

The intermediate hope is that, through the use of optical character recognition techniques, all typewritten records at the Archives will be entered into a computer database within a few years. But the first practical typewriter was not even invented until 1868, and Johnson does not see any real hope of computerizing the Archives' reams of handwritten records.

However, he does see more and more cooperation among individuals who have learned the value of using a computer to search for their roots. On their own, individual genealogists and small, dedicated firms are

computerizing bits and pieces of data from the Archives and from other sources.

"We have isolated databases here and there that can be searched via a computer and a modem," says Johnson. For instance, a Utah company called Accelerated Indexing Systems has put many of the U.S. Census records from 1860, 1870, and 1880 into a database, and the State of Kentucky is in the process of entering much of its archival material into a database.

One of Johnson's objectives is to encourage genealogists to open their files to others and share the golden information that has to be dug out so painstakingly. "If someone is working on a project, we'd like them to let us know about it," he says. "We'll mention it in our Computer Interest Group newsletter so that there won't be any duplication of effort. The more we can share and avoid duplication, the more we will be able to accomplish."

When genealogists' thoughts turn to accomplishment, they turn toward Salt Lake City. What the National Archives attempts to do for the nation, the Church of Jesus Christ of Latter-day Saints (LDS) is hoping to do for the world.

Mormon theology promotes an interest in one's ancestry, and the church's stated goal is to document the existence of every human being who has ever lived. Here we're talking *giga-data*.

This ambitious quest has led LDS to create an extensive library in Salt Lake City dedicated to genealogical research. More than a billion names are now on file there, including yours and mine. One does not have to be a Mormon to use the resource because the Mormons, like other genealogists, realize that the search for accurate information is of mutual benefit. Genealogists share what they learn.

All in all, for present-day genealogists, the future has become almost as exciting as the past.

—WILLIAM HOFFER

William Hoffer is a freelance writer in Woodbridge, Virginia.

Seattle's Slew of Software

I ventured to Seattle recently with the idea that I would spend a few days there, get rain-soaked, and come back with the definitive reason for the modest explosion of software in that strange corner of our nation. Besides mighty Microsoft, there are hosts of other software companies in the so-called Silicon Northwest, ranging from tiny start-ups to those on the third or fourth rung of the venture capital ladder. I wondered why.

Consensus attributes the phenomenon to a variety of reasons. First, there is the large defense contracting community, particularly Boeing, which has a huge computer division. Periodically some manager there teams up with a sub-genius programmer and forms a new company.

There is the University of Washington, which several people assured me has the sixth (or is it the seventh?) leading computer science department in the United States of America. It is one of two universities to offer degrees in software engineering.

Then there is Bill Gates, who is as much a natural resource there as the mountains. He and his partner, Paul Allen, come from Seattle, and the pair consciously brought Microsoft back home after they started it in Albuquerque. Microsoft grew to be a giant company, of course, and became kind of an anchor for a software community.

At the scene of the software explosion in Silicon Northwest



Geography is also a factor. The climate is one of relentless moisture, often dripping down in annoying quantities, other times coalescing in a drear fog—but some people don't mind it too much. The beauty of the Olympic Mountains and the absolute *livability* of the area overwhelm those considerations.

Typical is Richard Leeds, now head of Bellesoft, who 10 years ago stopped in Seattle on a trip and told himself, "One day I'm going to work and live in Seattle." Hal Glatzer, a local technology writer, has a theory that the climate is ideal for computer work: "The temperatures are mild, and the area is beautiful—but the

rain makes things just bad enough so you won't be looking out the window all the time, getting itchy to go outside."

Even such a booster as Richard Leeds admits that "there's a tendency to turn gray for weeks on end . . . that gets a bit old." But he brightens by saying, "If you don't mind needing gills, it's a nice place to live." Even if it is in Bellevue.

Beautiful Views

It seems that Bellesoft, like Microsoft, is not located in Seattle proper, but in Bellevue, the throbbing epicenter of Silicon Northwest, a place across Lake Washington from Seattle. Bellevue, infused with the growth of technology-based industries, is now the fourth-largest city in the state of Washington. Don't let the facts fool

you—it is Suburbia, with pine trees.

"Bellevue is quite the Yuppie land," says Jeff Sanderson, a 25-year-old product manager at Microsoft. It seems prone to spontaneous eruptions of fern-bar restaurants. "There's one new one," says Sanderson. "It's got the mauves and the beiges, bar stools and backgammon. It has mainly American food but serves sushi, too."

Despite efforts by the local chamber-of-commerce types, however, no one really thinks that the density of high-tech firms will ever approach that of Sunnyvale or Cupertino. Cer-

Steven Levy is a contributing editor of *Popular Computing*.

SOPHISTICATED RESULTS CAN COME FROM SIMPLE TOOLS.



The compass is a simple tool that has always helped people do sophisticated things. Like turn complex information into precise drawings, graphs, even maps.

PFS:GRAPH is a software program that's sophisticated enough to meet your business graphics and data analysis needs.

Yet, it too, is surprisingly simple to learn and use.

GRAPH was designed for people without computer experience. So all instructions are easy to understand. And you can be productive quickly.

Now you can create presentation quality bar, line and pie charts on most printers and plotters. In full color. In just minutes.

You can dramatize in a single striking visual what used to take thousands of words or numbers to explain.

Since GRAPH is integrated with the PFS Family of Software, it also allows you to turn the extensive data stored on PFS:FILE into easy-to-understand graphs. And you can reproduce graphs in the body of any document created with PFS:WRITE.

GRAPH is also compatible with VisiCalc® and 1-2-3™.

And compared to the cost of hand drawn graphics, GRAPH can pay for itself the first time you use it.

PFS: It's the powerful software that's simple to learn. It's the power of simplicity.

See your computer dealer for more details.



PFS SOFTWARE THE POWER OF SIMPLICITY.

PFS:GRAPH currently works on IBM® and equivalent personal computer systems, Apple®, Panasonic and Texas Instruments. © Software Publishing Corporation.

tainly, none of the current companies wants that to happen.

Bill Gates of Microsoft speaks for many when he says that "it's very attractive to have a company that isn't in the rumor mill" of Northern California. "If we were in the Valley," he continues, "we couldn't have kept our IBM products secret. Every time I went with someone for a drink, it would be a question of who's in the next booth."

Another aspect of Silicon Valley life that Northwest folks don't miss is the revolving-door syndrome wherein engineers and managers quit their jobs for a better position at the company across the road. There's very little of that in Bellevue. For instance, Wayne Erickson, chairman of Microrim, notes that almost none of his 100 employees come from Microsoft, and no one has defected in the other direction.

In that respect, at least, Silicon Northwest is distinct from Silicon Valley. But the fact that a community does exist, one small enough to get a grip on, gave me a sharper view of the software scene in general than is possible in the jumble of Silicon Valley. Unexpectedly, my stay in Bellevue offered me a neat panorama of the ways people create and sell software. The Northwest comprises a microcosm of the various approaches, and through the fog of Puget Sound I more clearly could discern the basic patterns of the software game.

Microsoft Alumni Club

Most everything now, of course, revolves around Microsoft. In the early days of Northwest microcomputing, though, Microsoft was in Albuquerque, feeding off the MITS company which made the first personal computer. Back in Seattle things centered around the area's first computing store, called, simply, The Retail Computer Store. Two of the early employees of the store were Tim Patterson and Bob Wallace.

Microsoft began to cast a long shadow even before it moved to Bellevue in 1980. Wallace went to Albuquerque to become Microsoft

employee number nine. Eventually Patterson moved over to Microsoft, too. His main project was implementing a certain operating system he'd written—the one we now know as MS-DOS. As Microsoft grew, it hired many people from outside the area, among them a programmer named Richard Leeds (employee number 61).

BILL GATES'S
goal at Microsoft
is simply to bring
the power of the
microprocessor
under widespread
use through
software.

Now, Patterson, Wallace, and Leeds have all gone separate ways. It is not exactly what you might call a hemorrhage from Microsoft—more like a normal stretching-out process. In forming their own companies, the self-styled "Microsoft Alumni Club" joined literally dozens of Silicon Northwest start-ups ranging from IQ Technologies (which makes a clever connecting device called the Smart Cable) to Seattle Silicon Technologies, specializing in computer-aided design software.

Patterson's firm, Falcon Technologies, is located in one of those anonymous one-story industrial parks that might have been airlifted out of Santa Clara. The man whose "Quick and Dirty Operating System" eventually became the standard adopted by IBM comes to work in T-shirt and loafers, and his office is loaded with stacks of printed-out code as well as more conventional tokens of his executive status.

He formed Falcon in 1983, and running the business—which makes disk drives for the PC and PCjr—has been "harder than we thought." Like other start-up companies, he's

found that it's tough to find experienced business help. Other than that, he sees no reason why his company should not thrive. Certainly he never considered moving from his native Northwest—"The mails work perfectly well from Seattle to California," he notes.

More indicative of Silicon Northwest start-ups is Bellesoft, headed by Leeds. Intimidated by Microsoft's growth, he formed a classic garage operation. A little over a year ago, having grown to seven employees and a crowded garage (piano benches and couches were being used as desks), Bellesoft moved into a "real" office. It has found a foothold in the software market with its Pop Up programs (calculator, calendar, etc.) for the PC.

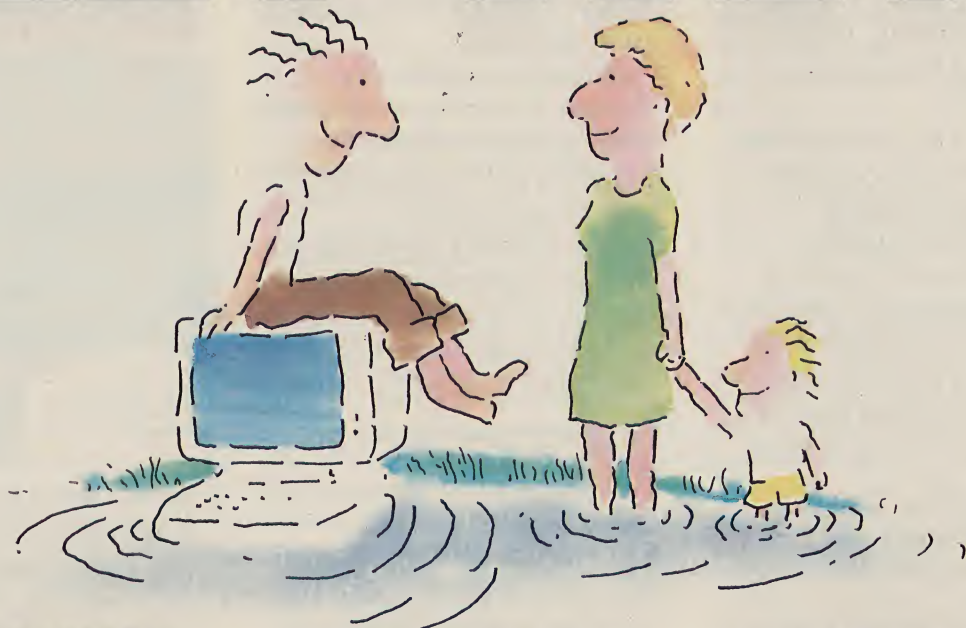
But it is a perilous course that Richard Leeds is charting. On one hand, he wants his company to grow. On the other hand, he puts a premium on compactness and community. "Small is something of which I'm an aficionado," he admits.

His former colleague Bob Wallace approached his start-up business in a different way. He also left Microsoft in part due to entrepreneurial zeal, in part disappointed by its unwieldy growth. So in January 1983, he figured he'd write that word-processing program he always wanted to try. By July he had PC-Write running on the IBM PC.

He distributed it by the "shareware" system. He'd set up shop at PC fairs, selling disks for \$10 a shot, urging buyers to copy the software and give it to friends, and if they liked it, to "register" the program and be eligible for printed manuals and phone support for a very reasonable \$75. After a slow start, some magazines reviewed PC-Write as a "real" product, and the reviews were very good—better, some said, than his former employer's much touted Word program.

But Bob Wallace doesn't like to gloat. Bill Gates does it his way, one that Wallace respects, and Wallace does it his own way. Sales in 1984 were around a quarter million dollars, up from \$17,000 in 1983. Microsoft did over a hundred million.

GET YOUR FEET WET...



...IN THE INFORMATION AGE WITH THE DOW JONES NEWS/RETRIEVAL® MEMBERSHIP KIT. SAMPLE A CONTINUOUS STREAM OF KNOWLEDGE AT A PRICE YOU CAN AFFORD.

Now you and your whole family can experience the information age without getting in over your head.

For just \$29.95, the new Dow Jones News/Retrieval Membership Kit leads you step-by-step into entertaining and informative data bases. With **five free hours** to sample and explore, you can find a fact, shop at

home, get the scores, plan a trip, review a movie, choose a stock, or check world and business news. There's a lot more, too. All you need to get started is a computer and modem:

The Membership Kit is a big value that entitles you to:

- FREE password (\$75 value)
- Easy, step-by-step User's Guide
- FIVE FREE HOURS of unrestricted usage to explore the magic of this comprehensive service

- FREE subscription to *Dowline*, the magazine of Dow Jones News/Retrieval
- A special introductory offer!

Get your feet wet in the information age with the Dow Jones News/Retrieval Membership Kit. At \$29.95, you'll enjoy the dip without getting soaked. Available at your local computer retailer, or call Dow Jones at:

1-800-257-5114
In New Jersey, Canada,
Hawaii and Alaska
1-609-452-1511



"Toss away any preconception that Dow Jones News/Retrieval is a stuffy, one dimensional data base service designed only for an elite corps of stock analysts and Wall Street wizards. Far from it—Dow Jones News/Retrieval also provides entertaining movie reviews, current weather and sports reports, convenient electronic shopping and inexpensive electronic mail. . .Dow Jones News/Retrieval is informative, entertaining and well worth the money."
-Brad Baldwin, InfoWorld Magazine

DOW JONES
NEWS/RETRIEVAL®

Copyright © 1984 Dow Jones and Company, Inc. All Rights Reserved. Dow Jones News/Retrieval® is a registered trademark of Dow Jones and Company, Inc.

INTRODUCING SPINWRITER E·L·F!

IT'S A SMALL PRICE TO PAY FOR LETTER QUALITY PRINTING.

Many popular personal computer applications demand letter quality printing. But until now, a good letter quality printer



You can control many functions with the touch of a finger.

came with a big price tag. Until the Spinwriter elf.[™]

The Spinwriter elf is a compact and durable letter quality printer. And it's the lowest priced Spinwriter[®] ever. But don't let the price fool you, it's still a Spinwriter.

Spinwriter printers are most preferred.

Spinwriter is the #1 name in letter quality printers for PC's. In fact, Popular Computing, Creative Computing and Datamation all

ranked Spinwriter as the #1 letter quality printers for business.

The reasons?

One is print quality. Spinwriter print quality is unsurpassed.

Another reason is Spinwriter's legendary reliability. Many Spinwriter printers go years without needing service.

And there's versatility. Spinwriter printers offer you over 70 different type styles. And more forms handlers than anyone else.

Find out how clever an e·l·f can be.

See your dealer for a Spinwriter elf demonstration. You'll find the elf can print an average letter in less than a minute. You'll find it comes standard with a sheet guide.



Makes popular software look even better.

And you'll find a control panel that lets you change type pitch and form length at the touch of a finger.

So see your dealer about the Spinwriter elf today. And you'll know you've found the right printer. For more information call 1-800-343-4418. (In MA call 617-264-8635). And see why so many PC users are saying, "NEC and me."



Not only is the print quality attractive, so is the price—\$545. for plug-compatible IBM PCjr. model; \$595. for model compatible with all other PC's.

NEC AND ME

NEC Information Systems, Inc.
Department 1610
1414 Mass. Ave.
Boxborough,
MA 01719
Inquiry 47



Spinwriter is a registered trademark and Spinwriter elf is a trademark of NEC Corporation.

Still, Wallace's company, Quicksoft, now has three full-time employees and is located near the Space Needle in a brownstone building also housing a yoga center. The phone seldom stops ringing, to the point where Megan Dana, Quicksoft's VP of operations, the person who draws the cute cat on the documentation, admits that they can no longer handle questions from people who haven't paid anything for their PC-Write software.

Soul of the Northwest

I got much of this intelligence from Wallace and Dana over Coho salmon at a nearby restaurant. But as fascinating as the shareware concept is, conversation keeps drifting back to his former employer. I think it is more than Microsoft's size that does this; the firm seems to have the same magic around Seattle as Apple does in the Silicon Valley.

As a contrast, the substantial Microrim firm fills floors of a large Bellevue building and has made millions of dollars with its R:Base and Clout software products; its chairman, Wayne Erickson, is building his own empire, with 100 employees and some impressive technology. But Microrim is regarded almost as an afterthought to the soul of Silicon Northwest—Microsoft.

Perhaps this comes about because Microsoft has made it a point to be at the cutting edge of personal computers, beginning with the Altair and continuing from the IBM PC to the Mac. So when it pulls off a success, like MS-DOS, or stumbles, like its failure to deliver its "Windows" software system on time, the shot is heard round the silicon world. Its relative isolation in the Northwest is no handicap in that respect—like Mohammed and the mountain, people have learned to come to Microsoft—including me.

With PR guide in tow, I marveled at the five—count 'em—large buildings in which Microsoft employees reside. All five will be vacated late in the year, when Microsoft moves from Bellevue to a new site in nearby Redmond. It is only one consequence of explosive growth. The

challenge for Microsoft is to maintain its values in the wake of that growth.

"The Microsoft culture is informal but intense—hardcore," explains Steve Ballmer, the VP of systems and for years the one who did the hiring at Microsoft. A day of talking to Microsoft folk bore that out—it is a cauldron of creative yet casual tension where everyone gets a private office and is hot-wired to everyone else by electronic mail.

Wizardry is valued above all in its technical people, and even, claims Ballmer, in its nontechnical people. "We look for people who are very, very smart—even the janitors—and people who care like hell about what they're doing."

It's an ambitious approach, incongruous to the laid-back Northwest atmosphere. But then, the whole operation is geared to an ambitious goal. Ballmer first learned this when, soon after he'd been hired in 1980 to "be the business guy," he asked Gates what Gates really wanted from all this. The answer? "To bring the power of the microprocessor under widespread use through software."

This is obviously the kind of thing you don't accomplish by being "an aficionado of smallness." Ballmer immediately set about hiring 17 programmers. Now Microsoft has over 700 employees.

Seattle Superstar

Of course, the most hard-core of all is Bill Gates, who greeted me wearing a lemon-yellow sweater I recognized from a Tandy ad in which he was shilling a Model 2000.

Bill Gates is unlike any chief corporate executive I have ever met. Pretension is alien to this superstar of Seattle computing; you feel that instead of a real chairman of the board someone has unleashed a brilliant hacker from the back room. Then you realize that he is talking as insightfully about business and marketing as he is about chips and coding, all while taking off his wire-rim glasses and rubbing his hands over his eyes, or sitting straight up with his hands in prayer position

while he rocks his torso back and forth to some nervous rhythm only he can perceive.

"There's a ton of software companies here—we have a different flavor," he says. "We've always had this unlimited view that there would be a computer for every home and we would provide the software."

It will be interesting to see how well Microsoft manages to traverse the tough times ahead, from getting its Windows software accepted (let alone shipped), to dealing with its finicky customer IBM, to making its ambitious goals on sales of Macintosh applications. But ambition is what built the company, and beneath all the talk of pretty mountains and good skiing, ambition is what drives the rest of the Seattle microcomputer community.

Northwest of Northwest

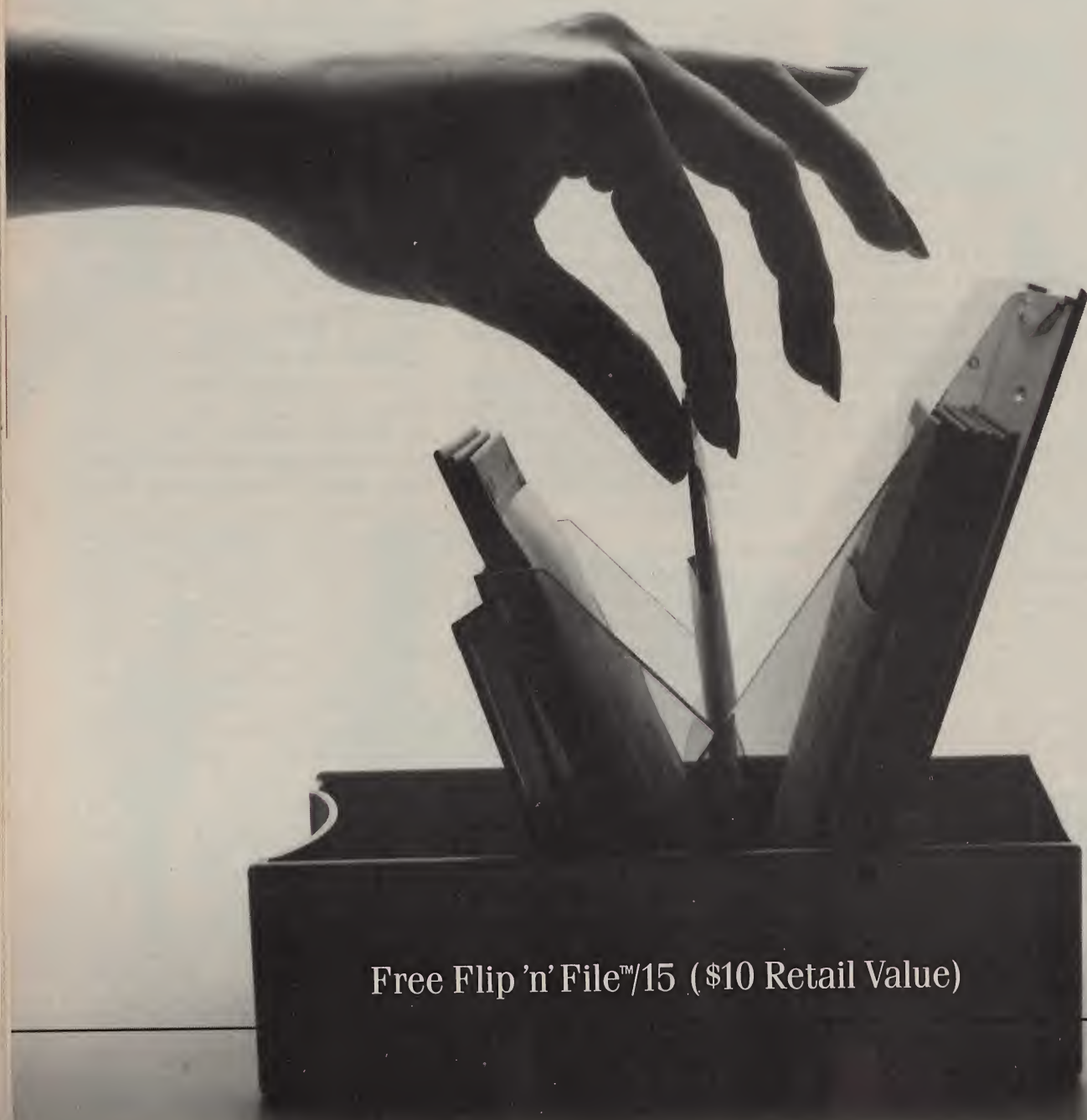
Well, almost all of it. The last thing I did on my trip to the Northwest was take a gorgeous hour-long ferry ride to a small island called Orcas. Waiting for me at the landing was Rudi Diezmann. He is a dapper fellow in his late 30s, spry and talkative. We drove to his home, which majestically overlooks the island's lush foliage. After greeting his wife and child, we went to the room on the upper floor where Diezmann spends his time—the computer room.

Diezmann has a different approach to software than the other people I'd met in the Northwest. He has no company of his own and works for none. He just writes code, from eight in the morning till the light is gone, often till midnight. That's the way he wrote a database for the Macintosh called Factfinder. Someone else is in charge of selling it. Rudy Diezmann simply does the kind of work he loves most, spends time with his family, and hangs out on Orcas, the stunningly beautiful island that is so Northwest that it's northwest of Seattle.

I think he's on to something. □

Steven Levy welcomes your comments and suggestions. You can contact him on The Source (ID TCT670) or CompuServe (ID 72065, 635) or by writing to him c/o Popular Computing, POB 397, Hancock, NH 03449.

Buy 10 flo stop worrying



Free Flip 'n' File™/15 (\$10 Retail Value)

ppies and about dust storms, lint attacks, or the bends.

The Flip 'n' File™/15 is an island of calm and order in the savage environment of the modern office.

It's also free, when you buy a specially marked package of 10 double or single sided, double density 3M diskettes. They're the certified 100% error-free diskettes; no floppies

are more reliable.

With this kind of protection, all you have to worry about now is when this limited special offer sells out.



Offer available from participating distributors, personal computer dealers and office supply dealers.

Which, if you don't hurry, could be before the next major coffee spill.

One less thing to worry about.™

3M
diskettes

A High-Tech Education

Every year we hear the breathless announcement: computers will revolutionize education, and this may be the year. So far it hasn't happened, but it's inevitable. Computers will change education at least as profoundly as did Gutenberg's movable type, and although it will take a decade or more before the educational establishment iceberg really changes, the capabilities are likely to come to us in a rush. Parents and nonestablishment educational institutions can make effective use of computers in education long before the public schools can respond. The trick is to keep track of what's going on so you can be prepared.

Schools have a problem: what do you use computers for? Are they more useful in lower grades to teach reading or in higher grades? These are questions that won't go away because equipping classrooms with computers is expensive. Most schools have one or two machines, generally donated Apple IIs and sometimes Tandy machines. Few school boards have enough money to allow every student, or every other student, to have one. Even if the machines were widespread, they'd have to be linked together for effective classroom use—but networking hardware isn't cheap either, and the software to link machines in an educational setting is more promise than reality.

Then there are the conflicts among

*Computers can play a vital role
but parents may have to get involved*



schools boards, administrators, and teachers. "We have a deal, just for you," the salesman says. "Because we like the El Wunderland School District so much, we're going to let you have 500 Texas Instruments 16-bit computers for only \$99 each!" After which the teacher has to find someone to tell her that the TI may be well designed, but it has been abandoned by its maker and no one is writing software for it any longer, get the administrators to understand that, and then convince the school board that it might be better to spend more money for fewer but more current machines.

In fact, the major value of using

computers in education may be to allow education officialdom—administrators and professors alike—a face-saving way to retreat from the dead end that they have led us into. For 40 years and more the emphasis on education theory has not been to achieve results but to excuse failure.

Case in point: you need not teach a child to read if you can show that the child "has" dyslexia. Of course it's a self-fulfilling prophecy: a kid who has dyslexia can't possibly learn to read, therefore no one tries to teach him. The tragedy is that real dyslexia—an actual inability to learn to read—is extremely rare. Reading specialists who see only problem readers may encounter such a pupil once in an entire career. Clearly the diagnosis is more common

than the ailment.

Once a child has been diagnosed as "having" dyslexia, the school's incentive structure is reversed. Now if the child learns to read, the school must admit that the diagnosis was in error. Few educators want to make such an admission. Under the present system there's little danger that they'll have to.

Computers can change the whole situation. Computers are new. They can work miracles. Where miracles are expected, miracles are common. I predict that the instant that we

Science fiction writer Jerry Pournelle, who joined the micro revolution eight years ago, is a contributing editor of *Popular Computing*.

convince principals and other school officials that computers can deal with dyslexia, lots of dyslexic kids will suddenly learn to read.

Besides "curing" dyslexia, using computers to teach reading in elementary schools can benefit lots of students. But there's a problem with this: if the students can't read, how do they learn what the computer wants them to do? The obvious answer to that is voice synthesizers, but so far I haven't found a combination of synthesizer box and speech software that I think acceptable. All the "educational" talking computers I have heard sound like machines and inspire the children to laughter or boredom. It's clear that good speech synthesizer chips exist. My Chrysler automobile has a speech system built around TI's chip, and while some of the computer's messages may be a bit odd—"A door is a jar" is one of the strangest—the car doesn't sound like a machine at all. It speaks with good clarity and diction.

So far, though, no one has built a reading program around the TI chip. The best speech system I have heard so far is one for the Apple IIe and IBM PC developed by Steve Ciarcia. There is also a program known as Smooth Talker for the Macintosh. The Macintosh has a "four-voice" speaker system built into its operating system; Smooth Talker makes use of that. It doesn't sound as good as my car does, but it's a lot better than many of the others. The drawback here is that while the Macintosh is easy to use, it isn't cheap, and there aren't a lot of them in elementary classrooms.

Alternatives

Until good speech synthesizers are widespread, as a practical matter, there are only three ways to use the computer to teach reading: employ a human reader to translate what's on the screen to speech, use the computer as a word processor, or use the computer to control a tape recorder.

Roberta Pournelle's reading instruction program uses a human: parent, sibling, tutor, grandparent,

neighbor, or indeed anyone who can read and is interested in teaching others. The computer then serves as a device to teach the "teacher" how to teach reading. The program sees that the "teacher" doesn't skip valuable lessons, gets the lessons in the proper order, and doesn't get bored. It also keeps track of the student's progress.

TEACHING children to read with the aid of a computer can be done by parents and siblings as well as by classroom teachers.

I'm told that at least a dozen such programs are in the works. Of course, few school districts can afford that kind of individualized instruction. On the other hand, parents often can.

Another approach that's often recommended is simply to use the computer as a word processor: the student dictates a story, the teacher transcribes it on the computer, and then the story is printed. This is said to give the students tremendous motivation to learn how to read "their" stories. It probably does that, and in the absence of a more structured reading instruction program, it may be something parents should do; but whether this is a good way for teachers to spend their time is open to debate.

Yet another recommended approach is to have the computer control a tape recorder. This has obvious drawbacks. While you can program a tape recorder to read lists of words, it's very hard to get it to loop back to a precise point. Setting up a program to "run" a real lesson turns out to be fairly complex. If students always got the same items

right—or wrong—then the spoken part of the lesson could be simply repeated on the tape. But fate arranges that pupils are never consistent. The result is an individualized program for each student, and that doesn't save very much time for the teacher.

One of the best ways to keep up with new developments in this area is through conferences. Among the best I've found are the conferences on Computers and Reading/Learning Difficulties put on by Gerry and Carol Block since early 1983. They have them on both the east and the west coasts, and now they're planning to add Chicago to their circuit. The Blocks also publish a journal, CRLA (Computers, Reading and Language Arts; 1070 Crows Nest Way, Richmond, CA 94803) which is well worth reading by anyone interested in the subject.

There still aren't many practical systems making effective use of microcomputers for education, but we're building a solid body of theory.

Creativity Software

A lot of software probably does something educational, but no one can figure out what. This stuff is usually called "creativity software." The theory is that the kid plays with it and the creative juices flow automatically. The imagination is stretched. New worlds are opened.

In my day we called that "reading books."

This isn't to say that some of the creativity software isn't useful. (The computer does let you experiment with real-life situations that are simply too messy or too complex without the use of simulation.) Anything that will lure children away from the horrors of TV—whether MTV or those ghastly afternoon cartoon programs—is likely to be useful. Indeed some creativity software is superb. For example:

The Factory, from Sunburst Communications (39 Washington Ave, Pleasantville, NY 10570) is a computer game that teaches quite a lot about spatial relationships and cause and effect. The game is quite simple: one student designs a series of ma-

All in all, WordPerfect is absolutely stunning.

PC Magazine

In the beginning, the creators of WordPerfect set out to design the perfect word processing software for business. Along the way, they tested each new function on the very secretaries who would eventually be using it. Thanks to them, the product lives up to its name: WordPerfect.

Easy.

Learning WordPerfect's basic text editing functions is quick and simple. Plus, comprehensive documentation and simple practice exercises help even beginners master WordPerfect's many other functions easily.

PC World

WordPerfect is a word processor for business applications.

Fast.

With WordPerfect's document orientation, you never have to wait between pages of text. No matter how fast you type, WordPerfect won't slow you down.

Complete.

In addition to standard word processing functions, WordPerfect includes many extra business features, such as a 100,000-word phonetic dictionary; table and index generation; multi-page foot-

noting; automatic outlining and paragraph numbering; and a network version.

Get the business word

processor that's living up to its name. WordPerfect.

For more information, see your dealer. Or call or write:

WordPerfect makes putting together a professional-looking balance sheet or financial report easy.

BYTE

SSI Software
288 West Center Street
Orem, Utah 84057
Information: (801) 224-4000
Order Desk: 1-800-321-4566,
Toll-free



SSI Software
Reaching for perfection.

**SEND
NO MONEY**

**JUST FILL OUT
POSTPAID CARD
AND MAIL**

**NO RISK
OFFER**

**FREE FIRST
ISSUE TO
EXAMINE**

**YOU'LL
BE GLAD
YOU DID**

**SEND FOR YOUR
FREE TRIAL
ISSUE TODAY!**

FREE First Issue

NO RISK GUARANTEE



Try POPULAR COMPUTING on us! If you like it, pay the introductory rate of \$12.97 for 11 more monthly issues (a total of 12). If not, write "cancel" on our bill, return it and owe nothing. Either way, the trial issue is yours to keep.

SEND NO MONEY!

4A65

Name

Address

City

State, Country, Province

Code

Subscriptions to Canada \$13.97 US, other countries \$21.00 US (surface delivery). Please allow 6-8 weeks for processing your subscription.

FREE First Issue

NO RISK GUARANTEE



Try POPULAR COMPUTING on us! If you like it, pay the introductory rate of \$12.97 for 11 more monthly issues (a total of 12). If not, write "cancel" on our bill, return it and owe nothing. Either way, the trial issue is yours to keep.

SEND NO MONEY!

4A65

Name

Address

City

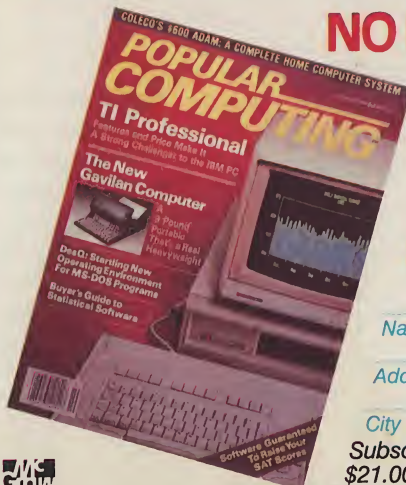
State, Country, Province

Code

Subscriptions to Canada \$13.97 US, other countries \$21.00 US (surface delivery). Please allow 6-8 weeks for processing your subscription.

FREE First Issue

NO RISK GUARANTEE



Try POPULAR COMPUTING on us! If you like it, pay the introductory rate of \$12.97 for 11 more monthly issues (a total of 12). If not, write "cancel" on our bill, return it and owe nothing. Either way, the trial issue is yours to keep.

SEND NO MONEY!

4A65

Name

Address

City

State, Country, Province

Code

Subscriptions to Canada \$13.97 US, other countries \$21.00 US (surface delivery). Please allow 6-8 weeks for processing your subscription.



BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 45 MARTINSVILLE, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

POPULAR COMPUTING

Subscription Dept.
P.O. Box 388
Martinsville, NJ 08836-9964

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



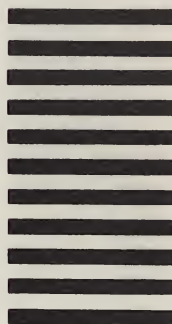
BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 45 MARTINSVILLE, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

POPULAR COMPUTING

Subscription Dept.
P.O. Box 388
Martinsville, NJ 08836-9964

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



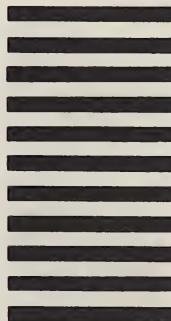
BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 45 MARTINSVILLE, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

POPULAR COMPUTING

Subscription Dept.
P.O. Box 388
Martinsville, NJ 08836-9964

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



SEND FOR YOUR FREE FIRST ISSUE



TODAY!

Dear Friend,

We're so sure you'll like *POPULAR COMPUTING*, we'll send you your first issue absolutely FREE!

It's written for you—in plain English, not technical "computerese." It's also a great opportunity to get in on the know of small computers and learn about their exciting potential.

Let's face it. Small computers are here, to stay. *POPULAR COMPUTING* will tell you everything you need to know: How to buy, what to look for, new products, software, interesting topics about today and the future—plus more! Don't get left out. Send for your trial issue today.

Harry L. Brown

Harry L. Brown
Senior Vice President/Publisher
P.S. You'll be glad you did.

MICRO REVOLUTION

BY JERRY POURNELLE

chines that can bore holes, paint stripes, and rotate a sheet of plastic. Then a sheet of raw material is sent through the factory. A shape emerges. Other players then try to design machines that will duplicate the final product. The game is fun enough that it had me playing.

Another, for somewhat older children, is The Robot Factory from The Learning Company (545 Middlefield Rd., Menlo Park, CA 94025). This program allows you to design robots. The robots can have bumpers, thrusters to move them, eyes to see with, grabbers to grip with, batteries to power themselves, and a whole host of other attributes. The player installs parts, wires them up in complex circuit diagrams, and applies power. (It all happens on-screen: there are no moving parts.) The object is to design a robot that can get out of a maze by itself.

If you get bored with simple robot designs, you can build up robot brains in computer chips and install those into robots.

The result is a game that's fun while teaching a whole raft of high-technology concepts. I can't imagine kids not being better off for having mastered this computer game.

The Factory and The Robot Factory are excellent examples of things you can't do without computers—of an entirely new kind of game that simply wasn't conceivable before the computer revolution.

The Revolution Continues

Computers will change education needs faster than even the best educational institutions can keep up.

The printing press fundamentally changed education. Prior to Gutenberg the primary teaching device was the lecture. "Lecture" comes from the word meaning to read, and no wonder: in the original "lecture" a graduate student read from a rare book, and the undergraduates frantically took notes because it was certain that they would never be allowed actually to have a copy of that book.

Cheap books of good quality made the traditional lecture obsolete. Today's students shouldn't have to lis-

ten to lectures unless the professor is inspiring. There are better ways to teach and good schools know it.

The computer will have that kind of impact on education. Up to now we have greatly prized the ability to memorize facts. Even after Gutenberg made it simple to keep most facts in long-term slow-access memory (books) we generally tend-

WE HAVE
always given high
marks to students
who could memorize
masses of facts,
but the computer
revolution will
change all that.

ed to give high academic awards to those who could fill their short-term rapid-access memory (brains) with facts. The best example is probably the spelling bee.

I would think that as the computer revolution proceeds, rote memory will be less prized. After all, I already have a spelling program that will outperform just about any national spelling bee champion.

Accessing Data

Scholastic, a major textbook and educational software publisher, is putting together large databases of materials on such subjects as history. According to Dr. Walter Koetke, Scholastic's director of technology, students can go spelunking through that database, framing and testing hypotheses, and learning history while also "learning the absolutely vital skill of using databases."

He's right, of course. In the near future anyone who can't retrieve complex reports from a database will be as handicapped as an illiterate was 30 years ago.

The rest of the theory can be

challenged. After all, we were able to frame and test hypotheses when I was in sixth grade. It was called "writing a term paper" and the database that we learned to use was the public library.

I suppose Scholastic would love the idea that the kids learn that all of the facts are resident on Scholastic Inc. disks, but with all due respect, I wonder if it's true. I'm sure the authors of those databases have tried to get everything right, but suppose they missed something. I presume that compilers of databases will try to get "just the facts," but what are those facts? I guarantee you that the facts we Tennessee kids learned about the War between the States were quite different from what students in Iowa got about the Civil War.

Perhaps it doesn't matter. Within a few years we will all—students and adults alike—have access to enormous databases. New technology allows us economically to "read" books into computers in the same way and about as easily as we make photocopies of their pages. Once the text is machine-readable, it's no great trick to write programs to precis it. True, the abstracts will to a great extent betray the prejudices of those who wrote the precis program, but others will have their whacks as well. I can foresee a time when a good Master of Arts thesis might be to make a new database "interpretation" of a classic work such as Federalist #10.

The point here is that computers, by doing things differently, can vastly change people's lives. Parents who realize this and pay attention can give their children a priceless head start. If they want to help their children get along in this world, they would do well to invest in a computer: but they ought to be very selective about the software, and they shouldn't neglect books and libraries. And perhaps this time when the explosion comes, we'll be ready for it. □

Jerry Pournelle welcomes comments from members of the micro revolution. Write to him c/o Popular Computing, POB 397, Hancock, NH 03449. Jerry tries to answer all his mail but cannot promise individual replies.

PRINTOUTS TH

Take a close look at Canon's line of printers. The first thing you'll notice is how good they make you look. That's because Canon's experience in high-tech optics really shows. For instance, Canon was among the first to make a desktop Laser Beam Printer. At a price that's within any business's reach, the Canon Laser Printer can produce eight pages a minute with a quality that's more in common with a professional print shop than a personal computer.

Canon also developed the ingenious Bubble-Jet Printer technology, finally making it possible for a printer to not only work extremely quickly but also incredibly quietly.

Our Ink-Jet Printer can produce exceptionally sharp, high-resolution graphics in seven colors, even on transparencies. While the Thermal Transfer Printer has three kinds of print modes, including letter quality, at a very competitive price.

And the Canon Impact Matrix Series, for regular and extra-wide column paper, makes printing very fast, very economical.

The man on the left is holding a document with a bar chart titled '85' showing data for four quarters. The woman in the center is holding a document titled 'Welcome to Westchester' which includes a table of contents and a list of items. The man on the right is holding a document with a table of items and prices.

INK-JET

LASER BEAM

IMPACT MATRIX

© 1985 Canon U.S.A., Inc.

AT STAND OUT.

Visit your local computer store and judge the complete line of Canon printers firsthand.

You'll find the print quality is absolutely crisp. The graphics are remarkably clean. And the reasons for buying one are perfectly clear.

For more information, call 1-800-323-1717, ext. 300 (in Illinois, 1-800-942-8881, ext. 300). Or write Canon U.S.A., Inc., Printer Division, P.O. Box CN 11250, Trenton, NJ 08650.

Inquiry 17

Canon
PRINTERS



Bubble-Jet Print

Unit	Qty	Unit Price	Total	Subtotal	Tax	Total
1000	1	1000.00	1000.00	1000.00	0.00	1000.00
2000	1	2000.00	2000.00	2000.00	0.00	2000.00
3000	1	3000.00	3000.00	3000.00	0.00	3000.00
4000	1	4000.00	4000.00	4000.00	0.00	4000.00
5000	1	5000.00	5000.00	5000.00	0.00	5000.00
6000	1	6000.00	6000.00	6000.00	0.00	6000.00
7000	1	7000.00	7000.00	7000.00	0.00	7000.00
8000	1	8000.00	8000.00	8000.00	0.00	8000.00
9000	1	9000.00	9000.00	9000.00	0.00	9000.00
10000	1	10000.00	10000.00	10000.00	0.00	10000.00
Total	10	100000.00	100000.00	100000.00	0.00	100000.00

Bubble-Jet Print

TO: Mr. Smith
FROM: Mr. Adams
DATE: 1/1/81
SUBJECT: Sales Results

Dear Sirs, please review the enclosed bar chart. The chart indicates our sales results for the second half of 1980. If you have any questions please let me know by return mail. I can be reached at the Dallas branch during the month of February.

Category	Sales (Thousands)
1	140
2	120
3	130
4	150

Thermal Transfer Print

April 15, 1981

Dear Mr. Smith,

We have just received the first shipment of our new product. It is a very exciting development for our company. We are very confident that it will be a great success. We are currently working on the final details of the product and will be ready to ship it to you within a few weeks.

I will be glad to get back to you on the subject but I'll get to that later. We are currently working on the final details of the product and will be ready to ship it to you within a few weeks.

Best regards,
Vincent

BUBBLE-JET

THERMAL TRANSFER

Natural Language Interfaces

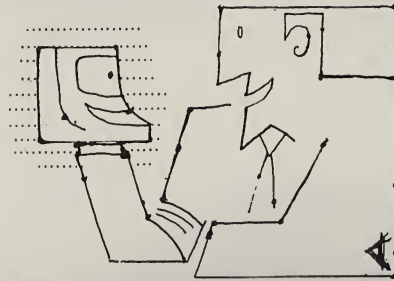
Doctor Dolittle was not the only one who had to learn a lot of different languages before he could talk to the animals. We all face a similar situation whenever we want to use several different software packages. Given the wide variety of programs and very different types of commands they use, we not only need to speak high giraffe, but also have to converse in fluent chimpanzee.

For instance, to read a document into a Wordstar file, the command is "Control-KR." A similar function in Lotus's 1-2-3 is "slash-FR." In dBASE II, try "attach." All these commands perform slightly different operations because of the different natures of the programs, but they have the same end result—they bring information from one file into another. Yet the language of the commands is quite different. It's no wonder that some new or casual users get confused.

Cracking the Language Barrier

One solution to this problem is a natural language interface, which in essence lets you operate a program with English words, not computer-language codes. For instance, rather than typing in typical computer commands like Dow Jones News/Retrieval's "GM 84 M", you use pre-defined constructs to create English statements like "What were the stock prices for General Motors for each month in 1984?"

Links that make your computer understand plain English



What are the headlines		
is the current quote for is the option price for were the stock prices for is the price/volume info for is the fundamental data for are the Dow Jones averages happened on Wall Street Week are the estimated earnings for is the Disclosure II info for are the headlines	Allied Aluminum Co. of America Amerasia Hess American Brands American Can American Home Products Anheuser-Busch Armco	on the composite tape on the New York exchange on the American exchange on the Pacific exchange on the Midwest exchange over the counter
concerning the company covering the topic of in the Economic Update in the Wall Street Journal in the World Report	for each month in for each quarter in for the last 12 days for the last 13-24 days calls in the month of	
Press: F10 to Back Up F11 to Start Over SHIFT-F11 to Quit RETURN to Select		

Natural language interfaces are an offshoot of research in artificial intelligence. True artificial intelligence is still in the conceptual stage, and most of the powerful systems built around it run only on larger, very expensive computers. However, we're beginning to see more AI concepts brought down to microcomputers, and indeed, several firms already offer natural language interfaces that can be put to good use on today's personal computers. In fact, over the past year, natural language interfaces have been developed both as "front ends" (friendly links between you and several varieties of existing programs or on-line databases) and

as query languages for database management programs.

A natural language interface used as a front end to an existing program or on-line database helps make that program or database easier to use. The interface lets you enter commands in conversational statements and circumvent the program's complex commands. The interface then converts your command into the syntax expected by the underlying program.

An early example of this is Texas Instruments' Natural Link to the Dow Jones News/Retrieval on-line database. With TI's system, you choose items from several menus to build a command—much as you would "choose one from column A and one from column B" in a Chinese restaurant.

For example, your initial choices might include such items as "What is the current quote . . .," "What were the prices . . .," and "What was the price/earnings ratio . . ." Depending on your selection, you then make choices from subsequent menus, including those listing stocks and time periods. By moving a cursor through two or three menus, you can build a question like "What were the prices for IBM for each month in 1984?" The program then dials up the service, enters your password, and enters the proper cryptic commands for you.

Michael J. Miller is a West Coast editor of *Popular Computing*.

MICROSOFT
P R E S S

Computer Hacking Exposed!

Now...at last...the inside story of the underground computer hacking culture, as told by the teenaged computer genius apprehended by the FBI and indicted by a Federal Grand Jury.

Here...from "The Cracker," are the revealing details of his more illustrious hacking capers...an inside look at the history of hacking...insights into the whys and hows of

breaking into corporate and institutional computers...along with the story of "The Cracker's" capture.

When does an innocent game of computer stealth cross the line to criminal activity? What motivates hackers? How can computer operators guard against would-be hackers and protect against the damage or theft of information worth millions?

Find out...in this engrossing and controversial exposé.

Out of the Inner Circle.
Look for it wherever books
and software are sold.

\$9.95, softcover
\$19.95, hardcover

Microsoft Press
10700 Northup Way
Bellevue, WA 98004

O U T O F T H E INNER CIRCLE

A HACKER'S GUIDE TO **COMPUTER SECURITY**

MICROSOFT
P R E S S

BY "THE CRACKER"
BILL LANDRETH
THE TEENAGE COMPUTER WIZARD
APPREHENDED BY THE FBI



DRAWING YOUR OWN CONCLUSIONS



... Is Easy With The Versatile HIPAD™ DT-114 From Houston Instrument.

Enter a whole new universe of graphics, made possible by programs tailored to the HIPAD digitizer.

Exciting new applications in computer-aided drafting are now available, allowing you to create subdivision plats, machine drawings, schematics, architectural elevations and circuit-board artwork . . . with your micro-computer . . . at your desk . . . with no training as a draftsman.

Use of the HIPAD in medicine is increasing. With currently available software, physicians and dentists can prepare graphics of anatomical features for diagnosis and correction.

Artistic efforts are complemented by the HIPAD. With customized software, free-form renditions can be created quickly and precisely. Colors to fit the moment can be selected . . . and easily changed at a later time. The

HIPAD provides access to the realm of high technology graphics.

The HIPAD features a full-size 11" x 11" digitizing area, and is both UL listed and FCC approved.

**The Conclusions You Draw Are Clearly Correct.
The HIPAD will open the door to a universe of
form and color . . . and creativity.**

For the name, address and phone number of your nearest representative, write Houston Instrument, P.O. Box 15720, Austin, TX 78761. Phone 512-835-0900, or 800-531-5205 if outside Texas for the name and location of your nearest representative. In Europe contact Houston Instrument, Belgium NV, Rochesterlaan 6, 8240 Gistel, Belgium. Tel. 059-27-74-45, Tlx. 846-81399. Inquiry 64

**houston
instrument**

HIPAD is a trademark of Houston Instrument

MILLER'S TIME
BY MICHAEL J. MILLER

TI followed its Natural Link to Dow Jones with other Natural Link programs that provide front ends for such complicated applications programs as Wordstar, Multiplan, and dBASE II, as well as for the MS-DOS operating system.

The firm also offers a natural language tool kit that software developers can use to create their own interfaces for programs on the TI Professional and the IBM PC. Such programs could do particularly well in smaller, vertical markets. For instance, Direct Aid in Boulder offers Legal Search Plus, a program that lets legal researchers access Westlaw, a fast but complicated legal database, and build their own thesaurus of synonyms.

Also, Menlo Corp. of Santa Clara has developed In-Search, a front end to Dialog, which is a collection of complex on-line databases of scientific and technical information, and BRS, a bibliographic database.

On-line databases such as Dialog, BRS, and Dow Jones are ideal targets for these systems because each database requires different and often complicated commands to do a data search. Moreover, natural language systems make the services easier to use for people who don't want to learn the complicated commands or who have an infrequent need for the service.

If you combine natural language interfaces with your operating system and a variety of applications programs, you'll have an operating environment that is easier to use than the standard MS-DOS environment. In fact, it should prove to be a good alternative to environments that use windows, icons, pull-down menus, and a mouse to provide a consistent user interface no matter what the application.

Natural Language Queries

Natural language programs for microcomputers also include query languages that help you retrieve information from large computer files created by database managers. In concept, using a query language is similar to using a front end to an on-line database. However, instead of

converting an English-like question to a program command, query languages use an English statement to search through data.

For instance, with the database management program Rbase:4000 from Microrim, in Bellevue, Washington, you would have to enter "Select Firm From Customer Where State Eq. Massachusetts," in order to look through a customer list for all contacts in Massachusetts. But using Clout, Microrim's natural lan-

NATURAL
language interfaces
could prove to be
a good alternative to
environments that
use windows, icons,
pull-down menus,
and mice.

guage option, you could merely type "Give me all the firms in Massachusetts," or something similar.

Something similar. That's the other great advantage. You can type in queries, and if the system doesn't understand, it will question you. For instance, if you type "MA" instead of spelling out the state name, it asks you what you mean. Once you tell the system, the abbreviation can be stored in a dictionary and used again whenever you want. Clout can also perform searches on files created with programs like PFS:File, Multiplan, and Lotus's 1-2-3.

Natural language query systems got their start on large mainframe computers, through systems like Artificial Intelligence Corp.'s Intellect. But several firms have designed programs for microcomputers. In addition to Clout, there is Savvy from Excalibur Technologies in Albuquerque, and Salvo from Software Automation in Dallas. All run on IBM PCs and similar machines.

Savvy uses a pattern-matching

technique so it guesses what you mean if you type a query it doesn't recognize. And though it does not work with files created by other programs, Savvy can change information in its own files, unlike Clout, which just retrieves information.

Crystal Ball Gazing

While natural language interfaces are typically much easier to learn to use than a complicated series of commands, the current products have their drawbacks. Reading menu choices or typing a complete sentence for a query may take longer than just typing in the actual command. Faster hardware coupled with programs that quickly convert English-like sentences to computer commands will speed this up.

Perhaps more troubling to the average computer user is the fact that none of the really large software firms has yet introduced a natural language product. In part this may be due to what Microrim chairman Wayne Erickson calls "the mainframe mentality"—developers think that AI techniques always require faster processors and larger memories more commonly associated with minicomputers and mainframes.

But more and more software developers are looking at natural language techniques and planning to incorporate them into their future programs. And in a few years, you may even see natural language interfaces combined with expert systems, decision-analysis tools, and other software techniques emerging from artificial intelligence roots to create a new generation of applications programs that are much easier to use, yet more powerful than anything we've seen to date.

While that new generation of software is still a couple of years away, even today's natural language interfaces can make life much easier for casual users and for people who are just learning a program.

Just think, if Doctor Dolittle had a natural language interface, how much easier it would have been for him to talk to the animals—or, at least, to his computer. □



A seat on the Exchange.





Step beyond the limits of personal computing, and into the action on Wall Street. Or right through the doors of the world's finest stores. Browse, buy, sell or trade. Stocks, information, Maine lobster, airline tickets. Without leaving your chair.

With an Avatex™ modem, your personal computer can take you wherever you want to go, on your schedule. As far, as fast, as often as you like, at a price that won't stop you in your tracks.

Avatex gives you the power, speed and intelligence of a serious piece of communications equipment, streamlined so anyone can use it easily and productively. Immediately.

So with Avatex the possibilities are astronomical, but the price of owning one is not: Avatex 300—\$64.95*, Avatex 600—\$99.95*, Avatex 1200—\$299.95*.

For the name of the Avatex dealer nearest you, call 800-4-AVATEX.

Avatex™ Modems

The next step in personal computing.

Avatex™ is a trademark of E·E DataComm UL/C·S·A & FCC Part 15 and 68 approved Copyright 1985 by E·E DataComm *Suggested retail price



I fell 20,000 feet and lived.

There I was flying Microsoft® Flight Simulator over Chicago's O'Hare Airport, having the time of my life. Suddenly my carburetor started icing. My RPMs started falling. My altimeter spun backwards. The Sears Tower loomed ahead.

I was behind the controls of a Cessna 182. As an experienced Microsoft pilot, I had taken off and landed at 80 different airports. Created different flying challenges (using my Microsoft Mouse and my joysticks). Altered the weather, time and season. Even flown the World War I dogfight mode and successfully battled enemy aircraft.

Whether you're using an RGB, composite or monochrome monitor, nobody flies the IBM®

PC and PCjr like Microsoft. Because Microsoft's MS-DOS™ operating system tells them how to think. And Microsoft BASIC is the language spoken by nine out of ten microcomputers worldwide.

The next time I flew they had repaired the Sears Tower. My next stop? The World Trade Center.

Sound fun? Then fly Microsoft. Call (800) 426-9400 for the name of your nearest Microsoft dealer. In Washington State, Alaska, Hawaii and Canada (206) 828-8088.

MICROSOFT®
The High Performance Software

Microsoft is a registered trademark and MS-DOS is a trademark of Microsoft Corporation. IBM is a registered trademark of International Business Machines. Microsoft Mouse and joysticks are not required.

do you ib'm?

*Andaone, andatwo, and a dance
with Big Blue*



Head the latest?" the Technoklutz demanded as he sloshed into my house on a recent rainy afternoon.

"What now?" I asked.

"The story," he said, collapsing his umbrella over my sofa, "is that IBM is branching out."

"Sounds right so far," I conceded. "But where?"

"Dancing lessons," said the Technoklutz, shaking out his sou'wester.

"You're all wet," I observed. "Dancing doesn't fit IBM's game plan."

"It fits," said the Technoklutz, "and the conception, looking back, was brilliant.

For two and a half years, a secret task force has been putting the project

together in Fargo, North Dakota."

"What have they come up with?"

"Initial concentration has been on breakdancing. Older applications, such as the twist, salsa, and bugaloo, will be supported in due course, but Big Blue wants to make a major splash at the entry level."

"What's the marketing strategy?"

"You'll love it!" chortled the Technoklutz. "IBM salesmen henceforth will wear Nikes and headbands along with their three-piece suits and white shirts. The Little Tramp will be replaced by Prince. For TV, there's a new ditty called *do you ib'm?*—it rhymes with 'rhythm,' sort of. The ads will show unusually excited yuppies carrying their IBM Personal Computers while dancing over cars and singing,

do you ib'm?

yeah I ib'm

got my Big Blue

who could ask for anything more?"

"It's catchy," I admitted. "Where did they get the operating system?"

"Bellevue," said the Technoklutz.

"Aha," I responded. "Microsoft."

"That's in Bellevue, Washington," he said. "This is a group of former patients from an old New York hospital by that name. Some of the most with-it steps were inspired by hilarious antics staged years ago in the Bellevue wards."

"Such as?"

"Well, *ib'm* version 1.0 is *tilde hop*, an amusing reminder to leap over the obstacle to the PC's Return key. Then there's *backslash bash*, a stutter step that warmheartedly pokes fun at typos caused by the superfluous key on the other side. But they've written off a number code-named *hot dog*, which emulated that overstuffed Return key on the AT."

"Pity," I said.

"I agree," said the Technoklutz, "especially since an Arthur Murray squad is close to completing *chiclet* on a grant from Compaq."

"That's for nostalgia buffs," I said. "The Murray programmers must be running scared because IBM is moving in."

"Can you blame them?" asked the Technoklutz. "Big Blue is projecting a 95 percent market share the first year, although they claim there'll be plenty of spillover because their mere presence will create new legions of breakdancing end users—do you think they intended the pun? Still, a Fred

Astaire spokeswoman said *ib'm* is just another lockstep routine."

"She'll be dealt with," I said.

"On the contrary," said the Technoklutz, "for the first time in the history of dancing lessons, a leading company will publish its choreography charts and challenge other companies to come up with *do you macintosh?*, *do you texas instruments?*, and *do you wang?*"

"Somehow those don't have the same zing," I said, "although I admire the open architecture."

Suddenly the Technoklutz blanched. "What happens," he asked tremulously, "if the *ib'm* becomes an industry standard and IBM makes everybody dance to their tune?"

"Here's your umbrella," I said. "It's coming down harder than ever." □

Contributing editor Stephen Banker's "Technoklutz" commentaries can be seen on the Public Television series *The New Tech Times*.

The TI Pro where no

Now you can have true CAD at an affordable price. Plus an out-of-this-world PC package for your unique computing needs.

High quality computer-aided design has usually meant working with highly expensive mainframes.

But now, with the TI Professional Computer and AutoCAD™ 2 software from Autodesk, Inc., you can put real CAD on your desk for under \$10,000. And you'll have a superior PC system for other computing needs — available in a package of hardware, service, training and support *no other PC offers.*

TI and AutoCAD 2 let you explore the outer limits of your imagination.

AutoCAD 2 gives you mainframe capabilities like multilayering and precise dimensioning, plus isometric design and piece part takeoff attributes. You can create your own symbol and parts libraries. Use bi-directional zoom to go from a full building elevation to the smallest bolt with trillion-to-one precision. And move, copy, rotate or delete any part of your drawing.

"You can use your imagination more and come up with much better designs much faster."

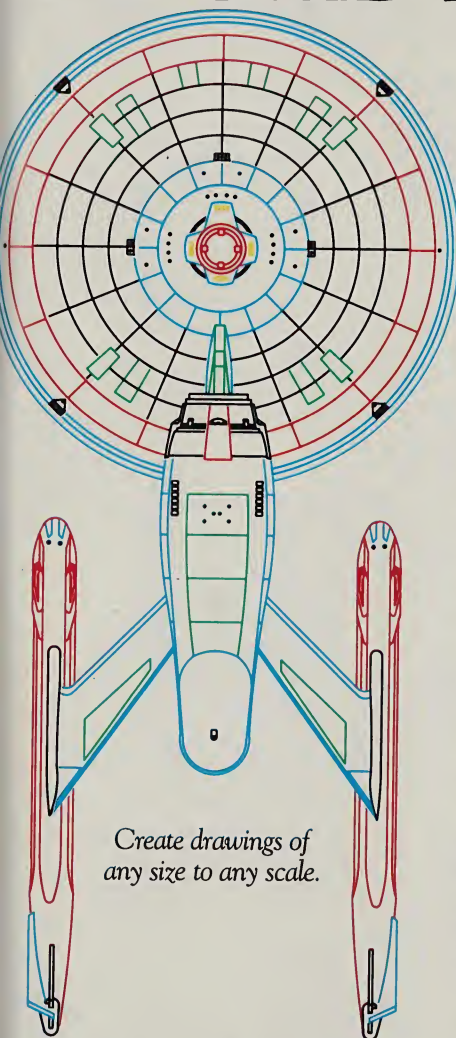
*-Lansing Pugh,
Architect,
Austin,
Texas.*

The perfect match of CAD and machine.

Running AutoCAD 2 on the TI Professional Computer can yield spectacular results. High resolution graphics (720 x 300 pixels) give you crisp characters, lines and curves. Unlike many PCs, TI shows up to 8



Professional Computer takes CAD PC CAD has gone before.



Create drawings of
any size to any scale.

colors simultaneously. And lets you mix and display text and graphics at once.

The TI Professional Computer is part of a complete system that gives you better performance from the best-selling software for other applications, too. It's an uncommonly expandable system that works with a vast range of peripherals. It can all be configured to your own individual needs. And grow as you grow.

We also offer optional service and support packages unobtainable anywhere else. Like a 24-hour customer support line. Extended 1- or 5-year service and support programs. And regional training seminars to get you started.

Is this the right CAD system for you?
TI has the answers.

You have your own special way of working, your own unique needs. If the answers below apply to you, the TI/AutoCAD 2 system is your best choice.

Q. Are your drawings dimensioned?

A. If they are, our system automatically computes them with a choice of linear, angular, aligned, circular and leader options.

Q. Do you often modify existing drawings?

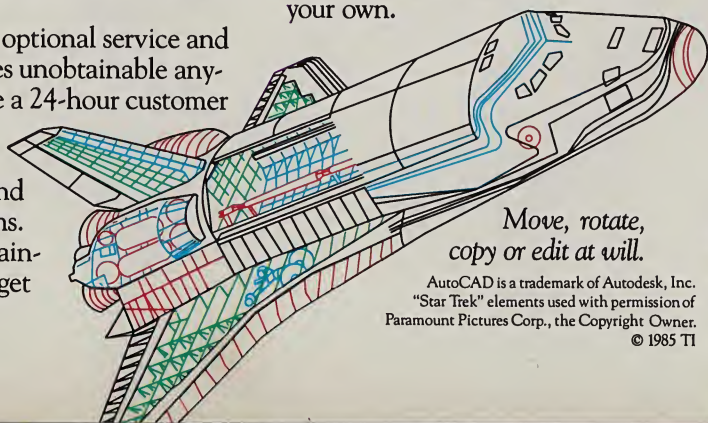
A. We make it fast and simple, with a revised, plotted drawing that looks as good as the original. So, your productivity will be greatly improved.

Q. Are overlays useful to you?

A. If so, you can store information in unlimited, named layers, and turn them on or off for display or plotting in any color combination.

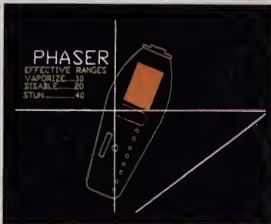
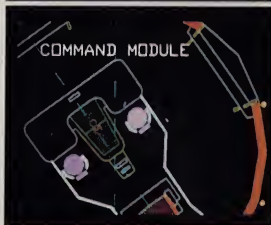
Q. Do you use standard symbols or parts?

A. AutoCAD 2 offers optional symbol libraries and lets you create your own.



Move, rotate,
copy or edit at will.

AutoCAD is a trademark of Autodesk, Inc.
"Star Trek" elements used with permission of
Paramount Pictures Corp., the Copyright Owner.
© 1985 TI



Beam down from the
big picture to the smallest
detail.

Q. What size drawings do you use?

A. Our system works with a wide variety of leading plotters for drawings from A-size (8½" x 11") to E-size (36" x 48").

Q. Do you have other PC needs?

A. The TI Professional Computer isn't just a dedicated CAD workstation. It runs over 1000 popular software programs for word processing, spreadsheets, accounting or other business needs.

Q. Is expandability important?

A. TI supports many expansion options, from communications to larger disks, printers, even to speech recognition, to improve your productivity.

Explore the possibilities.

Draw your own conclusions. For more details, or to arrange a demonstration at your nearest TI dealer, mail this coupon or call us at 1-800-527-3500. In Canada (416) 884-9181.

Name _____
Company _____
Address _____
City _____ State _____ Zip _____
Phone _____
Mail to: Texas Instruments Incorporated, P.O. Box 809063,
Dept. DCC052PL, Dallas, TX 75380-9063.



**TEXAS
INSTRUMENTS**

Creating useful products
and services for you.

2774-72

AT&T

Escalates the Micro Wars

BY JONATHAN SACKS

The Unix PC is its new weapon aimed at the corporate computer market

MORRISTOWN, NEW JERSEY, won its place in history as a warriors' haven during the long winter of 1777, when General George Washington chose the isolated valley town for his winter headquarters. Two hundred and eight years later this village of three-story colonials and historical markers is home to another headquarters, this one belonging to a corporate superpower fighting for dominance in the office of the future.

In a three-story bunker of concrete and glass just down the road from where Washington wintered, the generals of AT&T Computer Systems plot the strategy to bring their products into the offices of the Fortune 2000 companies. If they deploy well, they stand to win the traditional spoils—territory and wealth. If they err, the spoils will almost certainly go to other superpowers—to IBM, maybe even to upstart Apple.

There are reasons AT&T could prevail. It has The Power, that combination of money, innovation, and technology vital to success. And these days, having just unveiled a new secret weapon called the Unix PC, the AT&T generals are flush with optimism. Their new computer, co-designed and built by Convergent Technologies of Santa Clara, California, is a powerful 32-bit desktop micro that rivals in pure horsepower anything currently on the market. It boasts a minimum of a half megabyte of RAM, a 10-megabyte hard disk, and a virtual memory of 2.5 megabytes.

But AT&T's executives knew they needed more than muscular hardware in this war. So they took the Unix operating system—designed at Bell Labs for minicomputers and justly famous for its multitasking power—and put it on a microcomputer. At the same time they eradicated from their microcomputer version of Unix the trait for which earlier incarnations were justly infamous—a profound user hostility that utilized hundreds of archaic keystroke commands. In its place, AT&T created a new user interface, a series of menus that make the power of Unix instantly accessible at the touch of a key or the click of a mouse. As might be expected, the company also added telephone management capabilities to let users send data and dial phone calls directly from the computer.

It is an impressive package. In short, AT&T is armed for war.

The battle for dominance in the corporate computer market promises to be long and hard, and AT&T, torn by internal strife and attacked by outside forces, faces the fight of its life. The company, after all, didn't ever sell a computer to the public before March 1984. It couldn't, in fact, consider selling much of anything in a competitive way until January 1982 when this largest company in the world bowed to the pressures of the U.S. Justice Department and agreed to break up.

You need not know all the details of the AT&T divestiture to understand this: a company without competitors must operate very different-

ly from a company with competitors. And when the major competitor is as formidable as IBM, success requires a special strength. Therein lies the key to AT&T's battle for dominance.

The Legacy of Power

ONE MIGHT EXPECT that by birthright alone,

AT&T Computer Systems should succeed at anything it attempts. After all, it is still part of AT&T, which in 103 years as a regulated monopoly had blossomed into the largest corporation anywhere. Before the breakup was finalized on January 1, 1984, AT&T's status was reflected in mind-boggling numbers: \$150 billion in assets, \$69 billion in annual sales, and somewhere around one million employees.

The company also had a rich history of technological accomplishment. Bell Laboratories, AT&T's research and development arm, was responsible not only for Unix but for such inventions as the laser and the transistor.

But divestiture was awesomely hard on AT&T. In its wake, jobs were lost, titles were changed. Executives returned from weekends to find their departments disbanded. Perhaps more profound than the internal strife, however, was what the breakup meant to AT&T as a business entity. From January 1984 forevermore, the remnants of AT&T had to compete to survive. The telephone companies were gone, assets were down to \$40 billion, and the core of AT&T was split into smaller companies—divisions—defined by function.

One division, Information Systems, would operate at arm's length from the others and be responsible for marketing consumer hardware, from basic telephones to sophisticated electronics. One part of Information Systems, called Computer Systems, was charged with designing, producing, and marketing computers.

Making and selling computers isn't anything new to AT&T. The company has for nearly 30 years manufactured its own terminals and computers for use internally, to manage telephone systems and records. In fact, AT&T, through Western Electric, designed and manufactured one of the most advanced 32-bit microprocessors, the WE-32000.

"We haven't really attempted to move our computers into the Fortune 2000 yet, and not having attempted it, we are still a \$400-million-a-year revenue business," boasts James Edwards, the wiry, tough-talking president of Computer Systems. That income reflects the amount that Computer Systems made by selling systems to AT&T's operating companies (the telephone companies).

Edwards, 44, a magna cum laude graduate of Princeton, spent 15 years selling mainframe systems for IBM. In October 1984—after less than two years with AT&T—he became the top executive in Computer Systems. He is a charismatic leader with eyes that sear your soul—the very antithesis of the reserved executive you might expect to find at AT&T, a monolith notorious for its level upon level of bureaucracy and its lumbering decision-making processes. At Uniforum, a Unix convention in Dallas, Edwards became so involved in promoting his company's new line of 3B series minicomputers that he peeled off his suit jacket and marched onto the floor to hard sell. He has become known for his quick thinking and for a propensity to make important decisions instantly.

Edwards is responsible for leading AT&T to the computer war, and he has defined his marketplace and his strategy. For him, and therefore for AT&T, the ultimate market is the large Fortune 2000 companies, companies that in most cases already have mainframe computers. Edwards speaks a lot of SNA compatibility, referring to communications protocols necessary for terminals and computers to communicate with IBM mainframes. His strategy is to bring AT&T terminals, microcomputers, and minicomputers into the large companies and connect them to existing IBMs.

Jonathan Sacks is a West Coast editor of *Popular Computing*.

Outlining the details of his war plan, Edwards breaks the office into three workstation centers: a word-processing system for the secretary, a voice/data terminal for the executive, and a Unix PC for the professional. He thinks about conquering each and then about tying them to one another and to central databases. He talks in terms of \$30 billion worth of business in small and medium computers, and he steams at a *Business Week* quote in which IBM's chief executive officer vowed to capture a \$180 billion market within a decade.

"Everybody ought to be threatened by that kind of view," he fumes. And then, somewhat respectfully, he adds, "They're such good executors."

There are, insiders say, internal conflicts that make Edwards's mission all the more difficult. Some people, deposed as leaders or irritated at change, would like to see him fail. It is rumored that Edwards has been given a quota, something around \$1.5 billion in 1985, and he must make the quota to survive.

It's the kind of challenge Edwards relishes, and he is rolling up his shirtsleeves and going for the main chance. But he's under great pressure. Some battles are already lost.

AT&T on the Desktop

AT&T'S ENTRY INTO the microcomputer war was inauspicious at best, and it left many people wondering whether the company wouldn't be better off sticking with telephones. In March 1984, the company introduced the 3B line of minicomputers, an important step in the war plan. But it needed a presence in the desktop market.

That first desktop micro, the PC 6300, was built for AT&T by Olivetti—an Italian company in which



AT&T bought a 25 percent stake. Introduced in June 1984, the 6300 was greeted with a yawn and a harumph. A slightly-more-glitzzy IBM me-too that runs the MS-DOS operating system, the 6300 is functionally superior to the IBM PC—sleeker, with a smaller desktop footprint, and a faster, more powerful Intel 8086 microprocessor (an advanced version of the IBM PC's 8088). But it lacks any real innovation and falls short of full compatibility. Critics complained it just wasn't an IBM.

AT&T came under heavy fire for introducing a machine without any of the technical marvels one might expect from such a company. It was, said some people, too little too late, a misfire. Those who looked for the positive aspects of the 6300 were generally relieved at one thing: at least AT&T didn't go and make fools of themselves by putting Unix on their micro.

But while many still believe that the lackluster 6300 was an AT&T faux pas, the company claims it is all part of the larger strategy. "We felt that it was important that we not come out and exploit technology in our first run at the marketplace," says smooth-talking John Boyd,

Computer Systems' vice-president of sales. "I think had we done that, everybody would have said, 'Aha, AT&T. All technology, no marketing brains.'"

Edwards agrees that the 6300 was AT&T's deliberate low-risk attempt to ease quickly into the computer marketplace. "We were late coming into the PC business," he admits, "so we entered the market in a very conventional way."

Strategically, however, the 6300 put the AT&T name before the public in a new and important way. People began to think of AT&T as more than a telephone company. And to reflect just how confident AT&T was that it could succeed in this new market, it aired a television ad certain to threaten

the most secure competitors.

In the commercial, a business-suited man personifying AT&T walks up to a Monopoly-like gameboard called the Computer Game, puts his computer-shaped token on the board, and challenges the opposition. After moving quickly around the board, he leans back smugly. "Your turn," he says to the opponents.

To the consumer, the message is straightforward: AT&T has entered the computer game with serious intent. But think of the corporate cockiness such an ad projects to the competition. It suggests that the millions won and lost in personal computer ventures so far are mere trifles, a game. "Here we come," it says to the competition. "Step aside or be slaughtered."

That same corporate cockiness is reflected in the statements that Computer Systems executives make about the success of the 6300 so far. "In terms of full availability, you can say that in three to four months of business we reached 1000 retail stores," says sales v.p. Boyd, as he leans back in his desk chair and scans New York Harbor through the window of his office at Two World Trade Center, 71st floor. "Nobody has done that. Absolutely nobody."



The Unix PC

IN TERMS OF PURE technology, AT&T's new Unix PC is a jewel of a computer. It is immensely powerful for a desktop micro, with 32-bit architecture, state-of-the-art communications capabilities, a bit-mapped screen, and a virtual memory that lets you work with files that well exceed the limits of your RAM. Its menu-driven user interface is kind to the neophyte yet fast and straightforward enough that it won't irritate the experienced user.

The system is built around Motorola's 68010, a muscular relative of the 68000 used in Apple's Macintosh. The 68010 is agile, with a clock speed of 10 MHz, and can access up to 2 megabytes of RAM. This microprocessor is also responsible for the virtual-memory capabilities of the Unix PC, allowing portions of large files to be automatically "swapped" from RAM to disk memory.

In minimum configuration, the Unix PC comes with a half megabyte of RAM, a 12-inch monochrome monitor with a screen resolution of 720 by 348 pixels, and a built-in 300/1200-baud modem. The basic system includes one half-megabyte 5¼-inch floppy-disk drive and a 10-megabyte hard-disk drive. The 103-key keyboard includes 14 Wang-like word-processing function keys and 8 soft-

ware-definable function keys. A serial RS-232C port and a Centronics parallel port are standard, as are a clock/calendar and a graphics card on the motherboard.

Such power is costly. Although final prices had not been set at this writing, AT&T estimated the basic Unix PC will sell for about \$5600. With a 20-megabyte hard disk, the machine will sell for about \$6200; additional half-megabyte RAM cards will cost around \$1000 each.

AT&T armed the Unix PC with powerful communications capabilities. On the back of the machine are three "tip rings," those little jacks that are standard on modular telephones. Using a cable like the one that connects a phone to the wall, you use one jack to plug the computer to the phone lines and a second jack to plug your telephone into the back of the computer. If you have a second, separate telephone line, you can use the third jack for simultaneous voice-data communication.

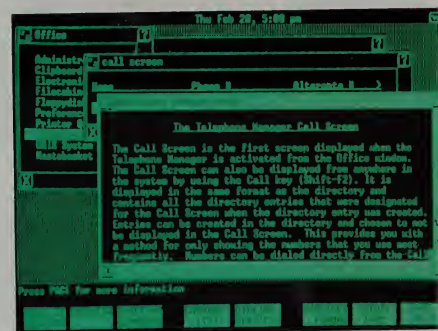
With the telephony software that comes with the machine, you can dial automatically from a computerized phone/address book, or you can dial directly from the keyboard. A speaker inside the computer lets you listen to incoming calls. The software also records the length of each call and the time it was made and keeps data on how often a certain number was dialed. You can append notes to this log to remind you of the subject discussed.

The Unix PC doesn't mark the first time Unix has been available on a

desktop micro, but AT&T did something with this machine that nobody before has achieved. It made Unix simple to use—virtually invisible unless you choose to access it. You select functions from a series of menus, either by clicking on menu items with a three-button mouse (included with the machine) or by moving the cursor to a menu item and hitting an "enter" or command key.

Applications, for example, are accessed by selecting the menu item "filecabinet." Opening the filecabinet reveals a list of the applications stored in the system. To access the telephone, you choose the "telephone" item on the main menu. Discarded files go into a buffer called "wastebasket." The electronic-mail application—which costs extra—is a separate menu item. Unlike the Apple Macintosh, the Unix PC does not use graphic icons to illustrate these functions. This was done, AT&T says, so the user interface would function on added terminals that might not have the graphics capabilities necessary for displaying icons.

Unix gives AT&T's machine some impressive power. It adds multiuser capabilities: two dumb terminals can share the Unix PC's processor and peripherals. Unix also sectors the computer's memory, allowing up to nine windows on the screen at one time and permitting a user to do nine different things concurrently. This feature of Unix—called multitasking—means you can work on one file,



THE BUILT-IN TELEPHONE SOFTWARE IS EASILY ACCESSED THROUGH MENUS OR THROUGH FUNCTION KEYS.

for example, while another file is printing and a third file is being transmitted or received via modem.

Such concurrency is available on other machines, including the IBM

PC family, using Concurrent CP/M. But AT&T's computer is designed for multitasking. Moving from window to window on the Unix PC, for example, is accomplished by moving the cursor to the "window manager," a boldface "W" in the upper righthand corner of the screen. But all this software power has its price—the operating system takes up 3 megabytes of disk storage.

The Unix PC has some welcome humanistic touches. A channel under the keyboard lets lefthanders string the mouse on the left. The monitor, built onto the 18-inch square base, tilts and swivels on a short gooseneck.

The computer also has some interesting technical extras: a utility that, AT&T says, converts standard MS-DOS data files to Unix; and an open architecture, including three empty expansion slots that in the current version will be filled if the machine is fully packed with 2 megabytes of RAM. (Future versions could use 256K-bit RAM chips, thereby allowing more memory per expansion card.)

Finally, Unix PCs can be linked via AT&T's recently announced STARLAN local-area network, which will also connect AT&T PC 6300s, IBM PCs, and AT&T minicomputers. Using existing phone lines and standard modular telephone jacks, the network will transfer data at the rate of 1 megabit per second. AT&T says that each microcomputer connection will cost \$595 plus \$125 for the software and will be available in late 1985. RS-232C connections, for linking printers and other peripherals, will cost \$750 each. Connections for minicomputers, which can act as file servers for large systems, will cost \$895 and should be available in early 1986.

All these features could be for naught unless AT&T succeeds in attracting software developers. Given the capabilities of the machine and the potential marketing strength of AT&T, it is likely there will be a lot more software soon.

Even that doesn't guarantee success, and AT&T faces tough competition. Apple is determined to penetrate the business market in 1985, and IBM will probably overcome technical problems that have hampered the sales of its troubled PC AT. The battle has just begun.

—JONATHAN SACKS

James Edwards claims that his company's productivity per store—the number of machines moved each month by each retailer—is equivalent to both Apple's and IBM's per-store productivity. "Of course, we have only about half the outlets they have," he says, "but we're doing pretty well." In fact, Edwards thinks AT&T is doing so well that he seems to view Apple and essentially every other computer manufacturer, except IBM, as mere irritations.

"Apple and the little guys like Compaq are doing a reasonable job in the retail channel," he acknowledges, "but they're positioned only in that kind of channel." And noting the failure of Apple and other companies to succeed in direct sales to large corporations, he says, "They haven't gained a position in the channel that I'm pushing into since they've been in business."

A tough-talking guy, this James Edwards. But it comes from the soul. Reminded that Apple has announced plans to move into the corporate marketplace and that the company has said it will forge "strategic alliances" to do so, Edwards nearly sneers. "I'm saying to them, 'Come on in,'" he barks, "because I think it's going to be a very, very difficult thing for them to do."

There's more you need to know about AT&T to understand the root of such bravado. Every workday, 6000 men and women march forth from 150 marketing offices nationwide to sell AT&T products to Fortune 2000 companies. The force of service technicians is 20,000 strong. Last year, both factions were retrained to sell computers.

And that's just part of The Power.

Ramping Up

THE PC 6300 MIGHT have been the easiest way to sidle into the marketplace, but AT&T executives knew they needed an edge, a product that would play to their strengths and outgun the opposition. So in October 1983, six months before the release of the 6300, they turned to scientists at the company's

brain trust, Bell Laboratories.

The Labs had not been fallow since the breakup. During and after the divestiture the scientists there continued to make important progress in the computer field. They announced plans to manufacture the first 1-megabit RAM chips, months and maybe years ahead of competitors. Then they announced that they had perfected something called a selectively doped heterostructure transistor, which permits supercomputer chips to operate at higher speeds. And then came an announcement that a Bell Labs mathematician had created a new theory that will enormously accelerate some computer operations.

From this fertile intellectual environment Computer Systems picked several people to join the team that would design the next-generation AT&T desktop, the now-released Unix PC. Those chosen to work on the computer were moved from Bell Labs to a newly created think tank, Information Systems Labs, located miles from the main AT&T offices.

The remote location provided a rare luxury, for while the larger organization was convulsing with the stress of divestiture, those working on the microcomputer design found themselves with a new and previously unthinkable control.

"We didn't get all the input you usually get at AT&T," says Leonard Greenbaum, a scientist assigned to help design the hardware and software specifications. We were setting up our own culture." And as the divestiture progressed, the AT&T brass seemed more inclined to share authority and also to make decisions more quickly than they might have in a noncompetitive environment.

For reasons mostly unrevealed but clearly related to a lack of manufacturing capability and small-systems expertise, AT&T contracted with Convergent Technologies to assist in development and production of the machine. But first, AT&T scientists, marketers, and service personnel met in committee to create a list of everything the new computer might include and then to narrow the list to reasonable, cost-efficient proportion.

—Continued on page 146

They're tiny, work anywhere, and integral screens, built-in software, sort data, crunch numbers, and tele

LAPTOP CO

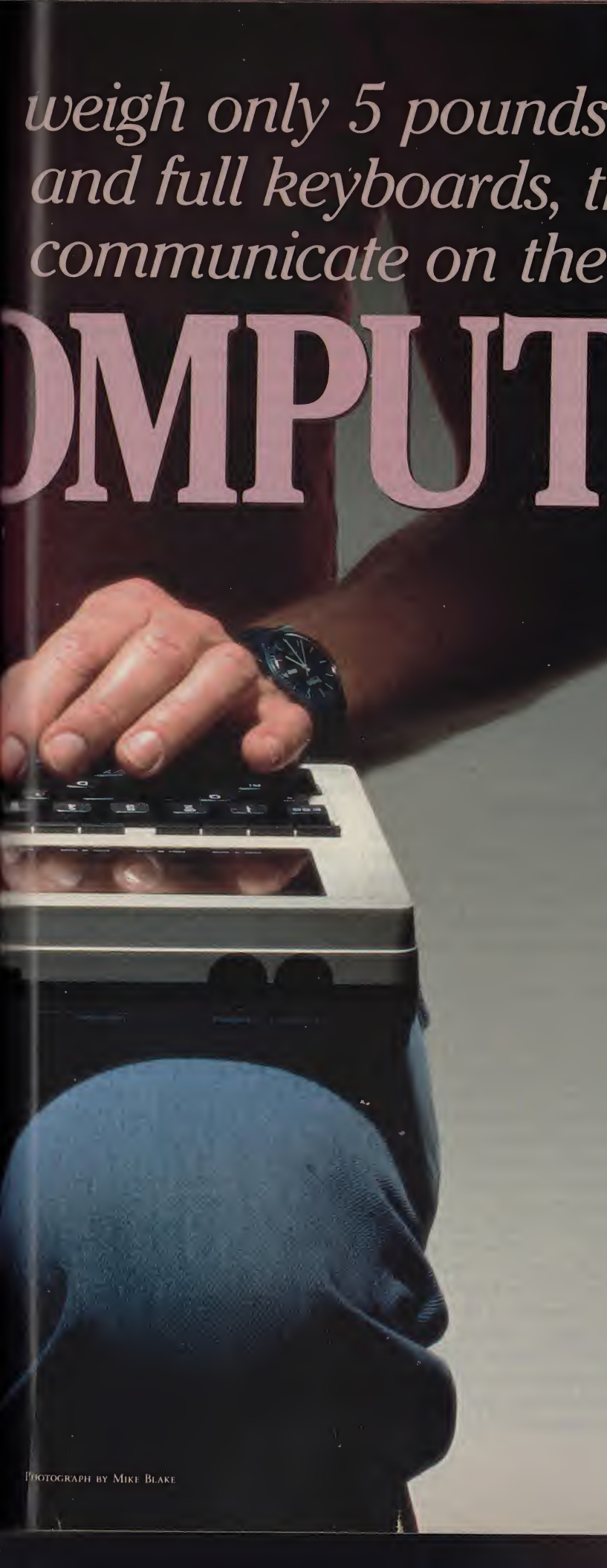
BY JOHN P. MELLO JR.

I remember the first time I saw a true laptop computer. It was compelling all out of proportion to its size. There, in one tiny package, was a combined word processor, telecommunications device, personal scheduler, electronic address book, and general-purpose computer. I didn't think twice. I bought it.

It wasn't a mistake—my laptop computer was and is a marvelously useful tool—but not in the ways I'd imagined. The word-processing program, for example, was fine for quick notes, but awkward and slow for serious writing and multipage articles. The always-on, battery-powered RAM automatically preserved my text and data without the hassle of disk drives, but its small size meant it filled up all too fast, requiring me to delete the saved material or transfer it to cassette—a lengthy, inefficient process. My initial enthusiasm for the little machine was quickly replaced by disappointment.

But now I've come full circle. As my experience grew and my preconceptions withered, I came to recognize that the shortcomings I perceived were more a result of my misconceptions than they were actual machine limitations. It was as if I'd bought a compact car and been disappointed when it couldn't haul a house full of furniture or do zero to 60 in 6 seconds.

In a nutshell, my expectations had been unrealistic. A laptop computer is not a jack-of-all-trades; it is, however, a master of some.



*weigh only 5 pounds. Yet with their
and full keyboards, they create text,
communicate on the go. They're...*

COMPUTERS

What Are Laptops Good For?

Laptop computers are a special class of portable computers: they're about the size of a loose-leaf notebook and weigh less than 5 pounds or so. They get their name from the fact that they can rest comfortably on your lap during use. (Some larger, 10- to 15-pound machines are also called "laptops" by their optimistic manufacturers, but I have yet to see a lap that could comfortably support one of these machines for any length of time. I'll restrict my discussion here to the smaller machines, the true laptops.)

All laptop computers are battery powered, have full typewriter-style keyboards, come with a built-in display screen, and are supplied with some software permanently stored in ROM to let you do many of the things you can do on a standard desktop computer. Compactness, portability, and affordability are the laptops' main assets; small screens and limited memory are the main drawbacks.

Will a laptop computer suit your needs? There are two main considerations. The first is physical: laptop computers excel in providing computing power in unconventional locations (in airplanes, hotel rooms, classrooms, meeting rooms, and outdoors, for example) and in preserving desk space. If you need computing power on-the-go or if your office can't accommodate a full-sized machine, then a laptop computer is indeed worth a close look. But if you do all your work in one loca-

John P. Mello Jr. is a freelance writer living in Malden, Massachusetts, and the former editor of *Portable 100* magazine.

Six features distinguish the superior laptops from the run-of-the-mill ones.



POP-UP SCREENS ARE INCREASINGLY COMMON IN LAPTOPS WITH LARGE DISPLAYS, SUCH AS THE TANDY 200, SORD 11C, AND EPSON PX-8

tion and don't mind sharing your desk with a standard computer, then there's really no reason to consider a laptop computer—especially since no currently available laptop unit fully equals the performance of a standard desktop machine.

The second consideration is more complex: you must gauge a laptop's strengths and weaknesses on an application-by-application basis, in the context of how it's to be used, in order to determine if it is really capable of handling your work load.

For better or worse, the major laptop computer applications were pretty much defined by the Tandy Corporation when it released the first successful laptop computer, the Model 100: word processing, telecommunications, information management, and specialty uses such as scientific analysis and inventory control. The current crop of laptop units adds one major new category: spreadsheet analysis.

Word Processing

More people have bought laptop computers for word processing than for any other application. Laptops are a natural for anyone who needs to compose text while away from the office. Laptops also can ease long workdays by making it simple to work on letters, memos, reports, etc., at home in the comfort of your living room. In effect, they're an electronic typewriter you can take with you wherever you go.

The features that distinguish a good laptop word processor from the not-so-good ones are the keyboard, display screen, memory, mass storage, printer compatibility, and bundled software.

The keyboard that's right for you is largely a matter of personal preference, but for efficient word processing, look for a keyboard with separate cursor-control keys in a diamond-shaped layout; user-programmable function keys; and a visual indication of whether or not the Caps Lock and Num Lock functions are engaged. The "feel" of the

keyboard and factors such as the size and spacing of the keys are subject to wide variation from one brand to the next: try before you buy.

Also, if you'll be typing in locations where noise will disturb others around you, pay attention to how loudly the keys respond to your touch—you'll want the quietest keyboard possible.

All laptops currently use liquid crystal display (LCD) screens in sizes ranging from 4 lines by 20 characters to 25 lines by 80 characters. The size of the display has a significant effect on what you write. One professional writer told me his paragraphs got shorter and his writing choppy after using a laptop computer with an 8-line by 40-character LCD screen.

But no matter how many characters are on the screen, legibility is even more important. Unfortunately, some of the screens are extremely difficult to read under anything less than ideal lighting conditions: personally, I've worked with 8 by 40, 8 by 80, and 16 by 80 screens, and the only one I felt comfortable working with in my living room was the 8 by 40. (Note: new technologies may eventually solve the problem of screen legibility. See "New Portable Displays," on page 73.)

Some laptops come with as little as 8K bytes of RAM, but the majority come with 64, 72, or 128K bytes and can be expanded with optional, add-on RAM chips. Of course, the amount of RAM greatly affects the machine's utility—8K of RAM can store only about 4 to 6 pages of text. Make sure the machine you buy has ample RAM for the largest document you're likely to create.

In order to get around RAM limitations, some sort of permanent, mass storage of text and data is a definite advantage. Currently, no laptop comes with a built-in disk drive, although most can operate an optional, external drive. Other machines, such as the Sord Consultant series, come with built-in, high-speed microcassette tape drives.

While not as fast as disk drives, built-in microcassettes are faster and more convenient than the mass storage used by most of the rest of the machines—ordinary cassette tapes. Conventional cassettes are better than no mass storage at all but are slow and sometimes unreliable.

If you want to produce paper copies of the text you write with your laptop, make sure the machine is compatible with the type of printer you'll be using.

A final important consideration is the word-processing software available for the laptop computer—both built-in (in ROM) and commercial programs. Some built-in software is quite limited; the Model 100 "Text" program, for example, does not let you set margins or adjust line spacing for printing. Other programs offer virtually all the functions found on desktop systems. Be sure the machine you buy has software with whatever features you need.

Spreadsheet Analysis

Laptops are less than ideal for heavy-duty number crunching. Some of the drawbacks, such as small screens and limited memory, are obvious. Others are less obvious, though no less important. For example, most laptops lack a separate keypad, requiring that you use either the regular number keys or some of the alphabetic keys as a pseudo keypad. What's more, the central processors used in laptops are relatively slow, with some operating at as little as one-fourth to one-eighth the speed of desktop machines.

Despite all this, due to the immense popularity of spreadsheet applications software, most of the current crop of laptops do come with small, ROM-based spreadsheets. Laptop computer spreadsheets usually try to sidestep their limitations by allowing you to save your work in a form you can send to a desktop computer for final analysis—a reasonable compromise. If this application interests you, be sure the portable and desktop spreadsheets use the same file structure and that the laptop's telecommunications software can transmit the data without undue difficulty.

Also, pay special attention to the legibility of the screen; transposed or incorrect numbers that you miss will play hob with your calculations.

A keyboard that easily switches between alphabetic-input mode and numeric-keypad mode is another plus; likewise, laptops with large amounts of RAM and/or some form of mass storage—either in the form of add-on disk drives or microcassette drives—are preferred in this application.

Database Management

With few exceptions, there's not much laptop database software to choose from. However, one manufacturer, NEC (see "The NEC Starlet," page 86), includes a file manager with its new laptop computer; Tandy also includes simple database programs for address filing and time scheduling in its Model 100 and 200 computers. A line of programs from Traveling Software (of Seattle Washington) lets you use a Tandy or NEC laptop to manage time. The software prints reports detailing the total time spent on an account, time spent on each assignment within an account, and the amounts a client should be billed.

Abundant RAM and some sort of mass storage are the keys to making database management genuinely useful on a laptop computer. And because the information in a database can be textual, numeric, or both, a good keyboard and screen are also essential; in fact, this category shares most of the same hardware requirements as word processing.

Telecommunications

Communication between computers is another factor attracting people to laptop machines. For example, journalists have found that filing a story by modem is faster and more accurate (if less romantic) than the previous method of phoning in the story. Salespersons can place orders with the home office's computer through the telephone; and after making a sales call, they can send follow-up correspondence through an electronic mail system like MCI mail. Some photographers are even using a national network to determine the weather at the next



OLD AND NEW—THE NEC 8401A, SORD 11A, COMMODORE LCD, AND EPSON HX-20. THE SMALL-SCREEN MACHINES ARE FIRST GENERATION.

NAME	PRICE*	SIZE* (in.)	WEIGHT* (lbs.)	LCD Screen	RAM (Kbytes)	KEYS (#)	Modem included	Bundled Software**	Comments
COMMODORE BUSINESS MACHINES 1200 Wilson Dr., West Chester, PA 19380									
LCD	\$500	12x10.5x2	5	16x80	32	72	yes	BASIC, wp, tc, filing, sched, address, calc	has 480x126 resolution; has bar code wand port; works with Commodore peripherals
EPSON AMERICA 2780 Lomita Blvd., Torrance, CA 90805									
PX-8	\$995	12x8.5x1.75	4	8x80	64	72	no	wp, calc, CPM, sched, BASIC	built-in microcassette drive
HX-20	\$795	12x8.5x1.75	4	4x20	16-32	68	no	BASIC, wp	built-in microcassette drive, built-in printer
NEC HOME ELECTRONICS 1401 Estes Ave., Elk Grove Village, IL 60007									
8201A	\$599	11.5x8.25x2	3.75	8x40	16-160	67	no	BASIC, wp, tc, 14 others	uses optional cartridges for extra RAM
8401A	\$999	12x8.5x2.5	3.75	16x80	64-96	68	yes	similar to above	uses plug-in RAM cartridges for extra memory
SORD COMPUTER 645 Fifth Ave., New York, NY 10022									
IS-11A	\$795	12x8.5x1.5	4.5	8x40	32-64	76	no	ss, db, gr, wp, tc	built-in microcassette drive; has parallel printer port
IS-11B	\$895	12x8.5x1.5	4.5	8x40	32-64	76	yes	same as above	same as above
IS-11C	\$1395	12x8.5x3.5	6.5	25x80	80-144	76	yes	wp, tc, calc	LCD is one of largest, clearest, in its class; has built-in microcassette drive; parallel printer port
TANDY CORP. One Tandy Ctr., Ft. Worth, TX 76102									
100	\$399	12x8.5x2	3.75	8x40	8-32	72	yes	BASIC, wp, tc, sched, address	lowest-priced laptop; has parallel printer port
200	\$999	12x8.5x2	4.5	16x40	24-72	72	yes	same as above, + alarm clock, and ss	includes Multiplan in ROM; wp includes text formatting for printing; has parallel printer port

* approx.

** wp=word processing; tc=telecommunications; sched=appointment scheduler; db=database manager; gr=graphics; calc=calculator; address=address database; ss=spreadsheet

day's shooting location. The possibilities are almost endless.

Telecommunications has two components: the creation of text and its transmission. For the former, the same considerations that applied for word processing also apply here. For the latter, the principal concern is the ability to drive a modem. Many laptops come with built-in modems, a definite plus. If you plan to make heavy use of telecommunications, look for a laptop that offers auto-dial capabilities (to automatically dial the telephone numbers and log-on sequences for on-line services), the ability to work in both direct-connect (plugged into the phone socket) and acoustic mode (for older, nonmodular phones), and a combination of both

tone and pulse dialing.

If your laptop does not come with a built-in modem, you'll have to buy a separate, external modem. This decreases the machine's portability by adding another piece of hardware to carry around, but also gives you the option of using a high-speed, 1200-baud modem to shorten the time you'll spend on-line. (Most built-in modems operate at 300 baud.)

Not much third-party telecommunications software exists for laptops. However, the machines that come with built-in modems also come with permanent, ROM-based telecommunications software that's usually perfectly adequate for normal needs. However, if you have a desktop computer and plan to swap information

between it and the laptop computer, be sure the laptop computer's telecommunications program will work with your desktop's—or that compatible third-party software exists.

Specialty Uses

Two other applications where laptop computers have proved their worth are in science and manufacturing.

The keys to scientific applications are programmability and expandability. Most laptops come with some dialect of BASIC in ROM. If you plan to write your own programs and want to be able to run the program on other systems, look for a standard implementation of the language: the Model 100 and 200, for

example, use a form of Microsoft BASIC, so programs can be adapted to run on other MS BASIC machines (such as the IBM PC) without great difficulty.

Laptops with standard interfaces (such as RS-232C ports) can be connected to a host of external sensing devices for all manner of sensing applications: for example, at the Stroh's Brewing Company in Detroit, analog information from a device measuring the alcohol content and density of a batch of beer goes directly into a laptop computer. The resulting calculations, done several times a day, are a quality-control measure. The application is so successful Stroh's is considering using the technique in other plants.

And in manufacturing, laptop computers also work exceptionally well as bar-code reading devices. With a wave of the bar-code wand the computer does the work, previously done by hand, of counting and adding inventories. Some laptop manufacturers have even gone so far as to build dedicated ports into their machines for connecting bar-code wands. However, the wands and software to read bar codes are extra-price options.

Is a Laptop for You?

As a narrow-focus device, laptop computers are grand. The machines have been eagerly accepted where their applications have been clearly defined and limited—the reporter or salesperson who needs word processing and telecommunications, the scientist or engineer analyzing and cataloging data from a single device, and so on.

But when you begin mixing applications—looking for a mechanical jack-of-all-trades to do word processing *and* spreadsheet analysis *and* database management, for example—you can find yourself, at the least, inconvenienced; at the worst, cramped. Similarly, you'll probably be disappointed if you expect or require full desktop power in RAM- or CPU-intensive applications such as large spreadsheets and databases.

Pick an application that fits a laptop's capabilities, though, and you'll never regret your purchase. In fact, you'll probably find it so useful you won't let it out of your sight. □

SPECIAL REPORT: PART TWO



AMAZINGLY COMPACT, THIS ELECTROLUMINESCENT PANEL FROM PLANAR SYSTEMS YIELDS CRISP IMAGES.

NEW PORTABLE DISPLAYS

Rapid advances mean portable computers soon will have screens with stunning color and clarity

BY THOM HARTMANN

YOU WON'T BELIEVE YOUR EYES: BEFORE LONG, you'll be seeing portable computers with screens that provide full-color, legible output under almost any lighting conditions. Other portables will display up to a million pixels on an ordinary-sized screen, far exceeding the resolution of even full-sized conventional monitors. Still other portables will offer large viewing areas at unbelievably affordable prices. Portable display technology is evolving at a furious pace. In fact, display types and designs probably will be the next major battleground for portable-computer manufacturers. The net result will be a generation of portables with truly outstanding displays: more legible, more colorful, less expensive, and with higher resolution.

AS YOU CAN SEE, THE 40-COLUMN TEXT (SMALL TYPE ON-SCREEN) SIMULATED ON THIS FULL-COLOR LCD MANUFACTURED FOR THE EPSON ELF TV IS BARELY READ-ABLE—A DEFICIENCY THAT RAPID TECHNOLOGICAL ADVANCES SOON WILL OVERCOME.



Currently five principal types of displays are solid contenders for the future portable-computer market: cathode ray tubes (CRTs), liquid crystal displays (LCDs), light-emitting diodes (LEDs), gas plasma displays (GPDs), and electroluminescent displays (ELDs). Each employs a different method to produce a display, and each offers a different set of advantages and disadvantages.

The two most familiar display types are CRTs (such as those used in most desktop computer terminals) and LCDs (such as those used in most pocket calculators, the Radio Shack 100, and the Data General One). Compass's Grid computer has been the only other commercially successful system—so far—to use neither a CRT nor LCD, employing instead an electroluminescent display made in Japan by Sharp.

CRTs

Cathode ray tubes use a beam, or ray, of electrons emitted by a cathode (heated electrode) to paint an image on the light-emitting phosphor coating on the inside face of a glass tube. CRTs are virtually identical to the video portion of a TV, and because their technology is well understood and long established, they've been the primary display option used by computer manufacturers.

But for portable computers, CRTs have two main drawbacks: high power consumption and size. The power consumption results from the fact that CRTs use a complicated set of electromagnets (called a yoke) to

sweep the beam of electrons across the phosphor and a high voltage applied to the front of the tube to speed up the electron beam enough to blast the phosphor molecules into emitting radiation, mostly as visible light.

Because of the electromagnets and the directional nature of the beam, CRTs traditionally have been long and funnel-like in shape. This explains why most TV and computer display housings are so deep and why early "portable" computers, such as the Osborne 1 and Kaypro II, were the size of sewing machines.

A recent innovation in CRT technology is the folded, flat-screen CRT. One of the first offered by Sinclair Electronics measures 4 by 2 inches and is $\frac{3}{4}$ inch deep. Both this and a similar new 4-inch flat-screen tube from Sony actually bend the beam through a curve to sweep the screen.

This design retains the advantages of a conventional CRT display (high brightness, contrast, and resolution) but requires an area only one-eighth as deep.

Sony also claims that its new tube uses only about one-third the power of its antecedents, another important consideration for portability.

GPDs

Hot on the heels of CRTs are gas plasma displays, which operate on the same principle as the familiar neon light bulbs extensively used as small, low-brightness indicator lights in a wide variety of consumer products.

An electric current flowing between two wires suspended in a gas—usually neon or a mix of neon and argon—causes the gas to become an electrical conductor (a "plasma") and glow. In a matrix of such wires, you can selectively activate individual X-Y coordinates to produce dots of light at predictable points in the matrix.

Changing the mixture of the gasses allows designers to vary the colors produced by the GPD and to alter the screen's voltage requirements.

First invented in 1964 at the University of Illinois by Drs. Bizter and Slottow, GPDs are now being pushed most heavily for computer use by IBM and Sharp. The two main obstacles that once limited use of these designs—the need for precise, close-tolerance electrode spacing in the gas envelope, and the lack

GAS PLASMA DISPLAYS USE A GRID OF CURRENT-CARRYING WIRES TO ENERGIZE A MIX OF GASES, CAUSING THE GAS TO GLOW AT PRECISELY CONTROLLABLE POINTS.



Thom Hartmann is a freelance writer living in Atlanta, Georgia.

Some new displays have four times the resolution of an ordinary 12-inch CRT.

of high-voltage integrated circuit chips to drive the displays (GPDs typically require 130 to 185 volts)—have both recently been overcome. The electrode-spacing problem was basically one of engineering and tooling and was quickly solved. And now Texas Instruments has introduced its 7555 series of high-voltage ICs to drive GPDs.

To give you an idea of the capabilities of a GPD, consider IBM's impressive Model 580: it can display 960 rows by 768 columns of pixels in an 11- by 14-inch area. This translates into more than 737,000 pixels, or about four times the display resolution capability of an ordinary 12-inch CRT.

Although the 580's high power requirements and weight presently eliminate it from consideration for portable computers, future refinements of GPD systems may well be seen in portables.

ELDs

Precisely because it takes high voltages and a good blast of power to ionize the gas in the gas plasma display, at present electroluminescent displays provide a more portable alternative. Similar to GPDs in the appearance of their design, electroluminescent displays also use an X-Y grid of electrodes. But instead of ionizing a gas, the applied voltage causes a layer of phosphor to glow, similar to that on the screen of a CRT.

Whereas it takes well over 100 volts to light a GPD, ELDs can operate in the 10- to 25-volt range and consume less power as well. Also, it's much easier to produce different colors with phosphors than with gasses, so ELDs can even be used to produce multicolor displays, much like conventional color CRTs. This can be done by either alternating phosphor colors along the screen (red then blue then green) as in a CRT or by layering three ELD panels, each with two-thirds of its area transparent for the transmission of the other two colors.

SONY'S "FOLDED" CRT PACKS A CONVENTIONAL-LOOKING SCREEN



INTO A TINY, SPACE- AND POWER- SAVING PACKAGE.

Planar Systems of Beaverton, Oregon, is in the process of developing a full-color prototype for the U.S. Army, while several of the Japanese companies are rumored to be about to announce full-color ELD displays suitable for computer and perhaps even portable-computer use.

In the meantime, Planar is currently marketing its EL6648 MX, a 4- by 8-inch ELD that is only $\frac{3}{4}$ inch thick and can display 25 lines by 80 characters, or 265 by 512 pixels. All the control circuitry needed to run the display, including interface electronics that allow it to be driven directly by CRT-type controllers, is mounted right on the back of the screen itself. This means the display can connect to standard computer systems without fancy design changes. While the display is currently selling to computer manufacturers for \$775, the company says it expects prices to drop to the \$250 range by 1987.

LEDs

Light-emitting diodes are used by the billions as simple, reliable, low-power indicator lamps. LED displays also have begun showing up in a variety of consumer devices, including automobile dashboards. But until very recently LED displays weren't considered a serious contender for portable-computer dis-

play screens because none have the necessary resolution.

The problems were twofold: size and color. First, it's very difficult to manufacture an LED small enough to be a pixel on a high-resolution screen. This is because the amount of light emitted by an LED has more to do with the amount of diode material than with the relative voltage or current applied; in order to be bright enough to be useful, an average LED must be about $\frac{1}{8}$ to $\frac{1}{4}$ inch across—hardly a high-res device. Because of this, many engineers had consigned LEDs to the domain of indicator lights forever. In fact, the LED's main computer use has been as a disk-drive "busy" light.

However, the development of new light-emitting semiconductor compounds that are as much as 50% more efficient than those now commonly used, and a new technology for manufacturing the lamps that simultaneously increases their efficiency and reduces their size, may make LED displays a viable contender for the future portable-computer market.

The second problem with LED technology was the inability to produce a full-color display. This is because, up until very recently, no one had succeeded in manufacturing a blue LED.

In order to create a true full-color display, you need red, green, and blue (or red, yellow, and blue, depending on whether the display emits or reflects light). Red, orange, yellow, and green light-emitting diodes have been available for years, but not blue. Now Toshiba has announced a pure blue LED that yields a bright, clear blue to give the third pixel of color needed in a full-color LED screen.

Also, because LEDs are semiconductor devices themselves, there is speculation that one day the drive circuitry and the display device may become one and the same product. It would greatly simplify circuitry design and probably lower costs, but

—Continued on page 138

AT RISK: YOUR ON-LINE FREEDOM

*Is freedom of electronic speech at stake?
The legal guidelines are hazy,
the reactions are not*

BY MATTHEW MCCLURE

T

HERE'S SOMETHING strange about telecommunications. Stories surface about addiction to on-line services, about monthly bills running as high as a mortgage. Behavioral scientists studying this mode of communication find an unusually high level of intensity, informality, and emotional outbursts by people normally more constrained. This electronic medium has a sense of freedom about it and a feeling of greatly expanded reach. But along with that freedom come abuses, and events of the past year have raised grave questions about privacy and free expression in telecommunications. There have been accusations of tampering with private electronic mail, censorship, illegal seizure of equipment, civil and criminal liability for electronically transmitted information, and illegal use of copyrighted material.

The problem is that no jurisdiction has yet been established for telecommunications and no legal precedents set. Many of today's pioneers are concerned that we all may lose our freedom of speech in this electronic medium through premature regulations, restrictions, licenses, taxes, surcharges, and even outright censorship. And with telecommunications becoming more and more commonplace, it's an issue that will affect you soon, if indeed it doesn't already.

The question at hand is how to deal with these issues and abuses, retaining the power of the medium but also keeping our legal rights intact.





A Question of Privacy

The American notion of privacy is rooted in English common law, where an individual's right to privacy is nearly absolute. For example, in Great Britain there are no itemized long-distance telephone bills; English law considers it an invasion of privacy for the government to know whom an individual calls. "If someone in England is suspected of participating in an illegal activity, there are other ways of investigating it," says Ken Phillips, chairman of the Committee of Corporate Telecommunications Users, a nonprofit organization representing the interests of the 30 largest corporate consumers of telecommunications services in the United States.

Moreover, Britain's traditional respect for privacy has been carried intact into the Information Age. "The British policy on privacy also applies to personal computers, shared databases, and packet-switched communications networks," Phillips says.

But in the United States, privacy is not protected so strongly. During the Nixon administration, Congress enacted a law that requires phone companies to keep records of long-distance calls. If a government agency wants to know whom you called, it can get that information from phone company records. On the other hand, the phone calls themselves cannot be monitored, according to the Communications Act of 1934, which made it a crime to intercept "any wire communication."

Telecommunications certainly qualifies as a form of wire communication. However, the Communications Act was passed long before data communications and electronic mail were even conceived. Consequently, Phillips says, the act leaves the door open to tapping telecommunications traffic without a warrant. "You could argue," he says, "that Congress could not have had legislative intent to protect data communications. The legislative silence about data communications leaves an open question."

Phillips frequently advises Congress and the Federal Communica-

—Continued on page 143

Matthew McClure is Research Director of *The Whole Earth Review* and operates The Well, a computer conferencing system in San Francisco.

Find the Then draw your

Microsoft® Multiplan® and Microsoft Chart. They're crackerjack programs working on their own. But you should see this pair in action together on the Macintosh.™

The one, a spreadsheet of dazzling analytical power and graceful simplicity.

The other, a picture perfect charting program that makes rows and columns of numbers graphically clear.

And the beauty is, they were literally made for each other. And for Macintosh.

Multiplan accepts you as you are.

Multiplan takes full advantage of Mac's simple, intuitive operating style. So you can work in a way that will come natural to you.

You don't have to memorize any arcane commands. Just point and click the mouse to move mountains of figures and formulas quickly and painlessly.

In addition, Multiplan gives you features that make hard copies gratifyingly readable. For instance, the enviable ability to print sideways.

So you can't run out of column room. No matter how wide your spreadsheet gets.

Chart makes people see what you mean.

Microsoft Chart gives you lots of ammunition for your arguments: Pie charts, bar charts, line, column, area and scatter charts. Or combinations.

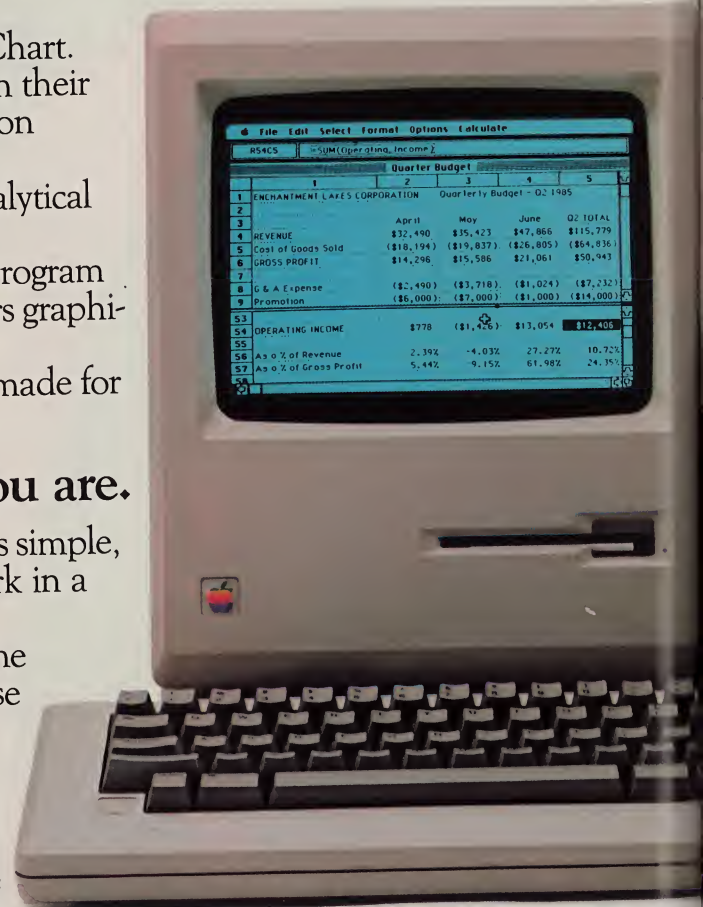
MICROSOFT

The High Performance Software™

Pick the one that best illustrates your point. Then translate your numbers into pictures and have them on paper in a matter of moments.

Using the mouse, it's a cinch to fine tune the graphs to get exactly what you want. Move any section. Change its size, shape, or highlight it.

Chart can even be linked with Multiplan. So any change on your spreadsheet will show up automatically on the charts.



answer. own conclusions.

We get the max out of Mac.

It figures that we'd be the ones to make Mac work so well with figures. We've written more Macintosh programs than any other software company. Including Microsoft Word, Microsoft File. And Microsoft BASIC, Mac's first language.

That experience shows in programs which not only exploit all of Mac's unique features, but make it extraordinarily capable and productive.

In addition, all of Microsoft's Macintosh products can exchange data with each other.

And because our programs work alike, if you learn one, you're

well on your way to learning the rest.

To find the name of your nearest Microsoft dealer, call (800) 426-9400. In Washington State, Alaska, Hawaii and Canada, call (206) 828-8088.

Then check out Multiplan and Microsoft Chart. And watch them perform some nice little numbers.

Microsoft and Multiplan are registered trademarks and The High Performance Software is a trademark of Microsoft Corporation. Macintosh is a trademark licensed to Apple Computer, Inc.

MICROSOFT

POPULAR REVIEWS

Hardware

Few people agree on exactly what size a portable computer should be. Is it enough for a portable to be merely "luggable" or should it be small enough to rest comfortably on your lap? The problem, of course, is that stuffing a small box with enough computing power to rival today's desktop systems requires some mighty clever engineering, which ultimately boils down to trade-offs in size and performance.



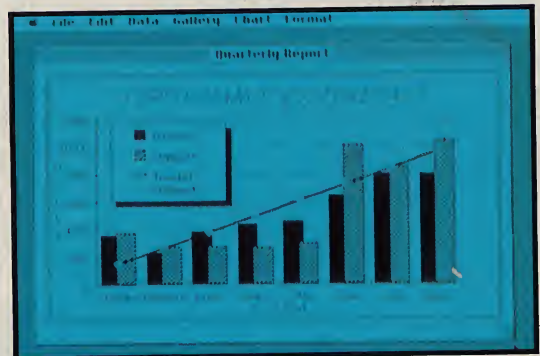
The
NEC
Starlet

Our reviews this month include three alternatives that exemplify such trade-offs and engineering efforts. One is the **Dataview 25**, Quadram's first computer; it uses a standard floppy-disk drive and has an 82-key keyboard. Then, to round out our report on laptop computers, we review NEC's **Starlet**, a powerful second-generation laptop computer that uses CP/M; and the **PG Expansion RAM** from PG Design Electronics that doubles the maximum amount of user memory in a Model 100, the still-popular first-generation laptop computer that paved the way for other portables in 1983.

—DENNIS ALLEN

Software

The generic names Microsoft has bestowed upon its **Business Series for the Macintosh** belie the quartet's true nature—there's nothing ordinary about Multiplan, Chart, Word, and File. Designed to be used alone or in concert, these productivity packages give the Mac new status as a serious



Word
for
the
Mac

contender for desk space in corporate America. West Coast Editor Michael J. Miller put these programs through their paces.

In another first, Infocom, the company that brought text adventuring to micros, has moved into a new arena with its premier business program, **Cornerstone**. The first in what Infocom says will be a series of business packages, Cornerstone is a menu-driven relational database whose powers are accessible even to those who weren't weaned on programming languages. Read about why reviewer Joel C. Don thinks this program will carve a secure place for itself in a crowded market.

—BEVERLY CRONIN

Books

As anyone even remotely attuned to the microcomputer book industry knows, buyer's guides, "getting started" tutorials, and other tomes that exclaim the wonders of computer technology have been done to death. What's next is a focus on people, and our reviewer finds just such a concern in Que's **Improve Your Writing with Word Processing**.

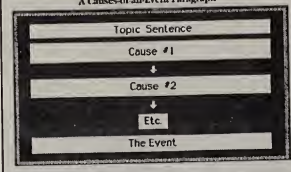
—TOM MCMILLAN

SESSION 7: Writing a Paragraph That Explains the Causes of an Event

A paragraph may explain why something happened. Several causes are presented in a chain of contributing factors that lead to an effect. This effect can be an event, a decision, a condition, a result, or a situation. Often introducing the paragraph is a topic sentence that prepares the reader to look for a series of causes explaining why something happened just as it did.

The Block Model

A Causes-of-an Event Paragraph



Improve
your writing

Make Any Computer Do Exactly What You Want With McGraw-Hill's

Contemporary Programming & Software Design Series



From Writing Your Own Programs to Modifying Existing Software, Here's the New, Easy, and Low Cost Way to Unlock the Secrets of Your Computer

Whether you use computers for business, for personal applications, or for fun, off-the-shelf programs will never do everything you want them to do for you. That's because they were written by programmers to satisfy what they perceived as the needs of the greatest number of potential users—often missing some or many of your specific needs.

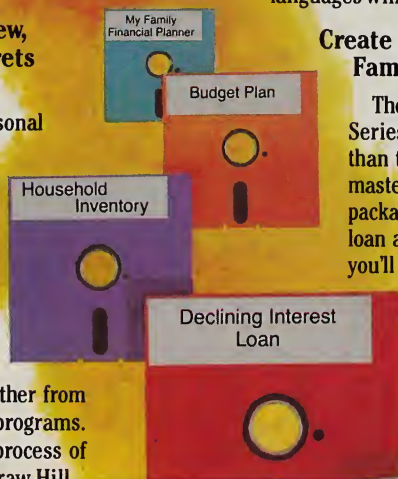
That's why McGraw-Hill's new Contemporary Programming and Software Design Series teaches you how to create your own software . . . either from scratch or by making key modifications to existing programs.

There is nothing magical about it. You learn the process of building a computer program step-by-step with McGraw-Hill

any one language or machine. Why? Because 95% of the programming process is carried out using design techniques that are independent of a specific language or machine. Nevertheless, we include enough training in BASIC and machine language to get you started. You'll find that the whole process of learning new languages will be greatly accelerated once you complete the Series.

Create a Complete, Customized Family Financial Package As You Learn

The sample programs you work with throughout the Series are excellent learning tools. But they're more than that. By combining the sample programs onto one master disk, you'll create your own family financial package that will help you balance your budget, figure loan amortization, and much more. And — of course — you'll be able to further modify your financial package to fit your own specific needs!



15-Day No-Risk Trial

To order your first module without risk, send the postage-paid card today. Examine the first module for 15 days and see how the Series will help you make any computer do exactly what you want it to do!

Contemporary Programming & Software Design Series

TRIAL EXAMINATION ORDER FORM

YES! I would like to learn how to make any computer do exactly what I want it to do and would like to examine the first module in the Series absolutely free. If I decide to keep it, I will pay just \$24.95 plus \$2.25 shipping and handling. I will then receive future modules automatically, one every 4 to 6 weeks. Each of the 10 modules in the Series is \$24.95 plus \$2.25 shipping and handling and comes on the same 15-day Trial Examination basis. There is no minimum number of modules that I must buy and I may cancel at any time simply by notifying you.

If I do not choose to keep the first module, I will return all materials in good condition and pay nothing. Future modules will be canceled and I will be under no further obligation.

Name _____
Please Print

Street _____

City/State/ZIP _____

Phone Number () _____

CREATE
YOUR OWN
SOFTWARE

Ten modules teach you how to write your own programs or modify existing software to fit your needs:

- Getting Started in Programming & Software Design
- Attacking the Problem
- How to Design the Solution and Arrange It Logically
- Coding the Program: High Level Languages
- Coding the Program: Assembly Language
- Testing and Debugging Made Easy
- Creating Meaningful Documentation
- Modifying & Updating Existing Programs
- Tools & Tricks for Program Design
- Writing Advanced Programs

to the card, write to us about the Contemporary Design Series.

n Center



ational Business Machines, Inc.

June 1985 Popular Computing 81

The interactive disks included with this series will run only on IBM or IBM compatible computers. All orders subject to approval and payable in U.S. funds only. Available in U.S. and Canada only.

2502-065

POPULAR REVIEWS

Hardware

Few people agree on exactly what size a portable computer should be. Is it enough for a portable to be merely "luggable" or should it be small enough to rest comfortably on your lap? The problem, of course, is that stuffing a small box with



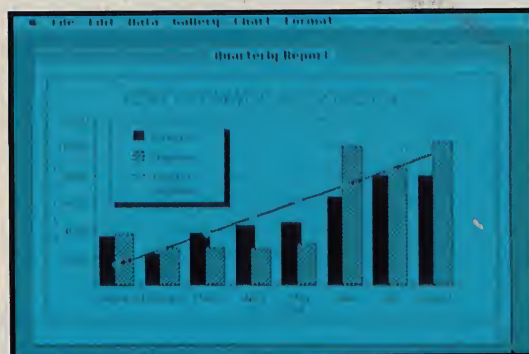
The
NEC
Starlet

enough computing power to rival today's desktop systems requires some mighty clever engineering, which ultimately boils down to trade-offs in size and performance.

Our reviews this month include three alternatives that exemplify such trade-offs and engineering efforts. One is the **Dataview 25**, Quadram's first computer; it uses a standard

floppy-disk drive and has an 82-key keyboard.

Then, to round out the portable computers, we review the second-generation CP/M; and the Design Electronics amount of user still-popular first that paved the way



Word
for
the
Mac

contender for desk space in corporate America. West Coast Editor Michael J. Miller put these programs through their paces.

In another first, Infocom, the company that brought text adventuring to micros, has moved into a new arena with its premier business program, **Cornerstone**. The first in what Infocom says will be a series of business packages, Cornerstone is a menu-driven relational database whose powers are accessible even to those who weren't weaned on programming languages. Read about why we

Software

The gene bestowed on the Macintosh nature—there's no plan, Chart, Word used alone or in packages give the

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 10008 WASHINGTON, D.C.

POSTAGE WILL BE PAID BY ADDRESSEE

McGraw-Hill

Continuing Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



Make Any Computer Do Exactly What You Want With McGraw-Hill's

Contemporary Programming & Software Design Series



any one language or machine. Why? Because 95% of the programming process is carried out using design techniques that are independent of a specific language or machine. Nevertheless, we include enough training in BASIC and machine language to get you started. You'll find that the whole process of learning new languages will be greatly accelerated once you complete the Series.

From Writing Your Own Programs to Modifying Existing Software, Here's the New, Easy, and Low Cost Way to Unlock the Secrets of Your Computer

Whether you use computers for business, for personal applications, or for fun, off-the-shelf programs will never do everything you want them to do for you. That's because they were written by programmers to satisfy what they perceived as the needs of the greatest number of potential users—often missing some or many of your specific needs.

That's why McGraw-Hill's new Contemporary Programming and Software Design Series teaches you how to create your own software . . . either from scratch or by making key modifications to existing programs.

There is nothing magical about it. You learn the process of building a computer program step-by-step with McGraw-Hill *Concept Modules* sent to you one at a time, once a month. Each of the ten modules in the Series takes you through an important step in the development of the structure and detailed logic of a program, including testing, debugging, and documentation.

Unique Interactive Hands-On Instruction

Each module includes an easy-to-understand guide PLUS a 5¼" floppy disk containing typical programs and interactive instruction that you can run on any IBM or IBM-compatible computer for hands-on experience.

In the first Module, for example, when your sample program (Declining Interest Loans) appears on your screen, you'll find errors on certain program lines. You'll also see that the program is only three-quarters completed.

Now comes the fun part. You'll discover how this program is built, and in the process you'll learn how to identify and correct errors. And by the end of Module 1, you'll actually have

completed this program yourself.

But there's more. Special graphics on your screen work in conjunction with the accompanying guide to amplify, illustrate, and deepen your understanding of software design principles.

Learn the Foundation of All Computer Languages

Although the Series teaches you programming procedures, it is not aimed at

Create a Complete, Customized Family Financial Package As You Learn

The sample programs you work with throughout the Series are excellent learning tools. But they're more than that. By combining the sample programs onto one master disk, you'll create your own family financial package that will help you balance your budget, figure loan amortization, and much more. And — of course — you'll be able to further modify your financial package to fit your own specific needs!

15-Day No-Risk Trial

To order your first module without risk, send the postage-paid card today. Examine the first module for 15 days and see how the Series will help you make any computer do exactly what you want it to do!



If someone has beaten you to the card, write to us for ordering information about the Contemporary Programming and Software Design Series.

McGraw-Hill Continuing Education Center

3939 Wisconsin Avenue
Washington, DC 20016

IBM is a registered trademark of International Business Machines, Inc.





The Quadram Datavue 25

Quadram's first computer: full desktop-machine power, IBM compatibility, and a 5¼-inch disk drive, all in a portable package

Until now, Quadram has been known as one of the leading manufacturers of IBM PC-compatible expansion cards, monitors, and other peripherals. And Quadram obviously learned some valuable lessons from that experience, because its first computer is particularly powerful, versatile, and cost-effective.

The portable Datavue 25 is 10½ inches high, 12¾ inches wide, and 6¼ inches deep, weighing in at about 14 pounds with its internal AC power supply (or optional internal battery pack). The \$2195 base model comes equipped with an 80-character by 25-line LCD, a single 360K-byte 5¼-inch floppy-disk drive, 128K

bytes of RAM, and parallel and serial ports.

The Datavue 25's reasonable price and a high level of expandability that permits it to effectively undertake every task a full-size desktop computer might be expected to do make it a formidable competitor in its field. But its ease of use makes the Datavue 25 even more attractive: just quickly peruse the manual, turn on the machine, and you're off to the races, running most of the popular software written for the IBM PC.

The Datavue 25, with its keyboard folded up against the display screen, stands upright on your desk looking for all the world like a little portable sewing machine. The keyboard de-

taches to reveal a tiltable, variable-intensity LCD screen. The Datavue 25 is, in fact, the first battery-powered portable with a detachable keyboard.

When tilted at about 60 degrees under an overhead light, the Datavue 25's LCD screen is easy to read. Alphanumeric characters formed with a 9 by 9 dot matrix are sharper than IBM PC characters created with a color graphics board. Which is not to say that LCD technology has yet approached the level of contrast needed to make it a viable all-day working display. I'd still rather work with a CRT monitor for long periods.

The Datavue 25 displays essentially everything that might be seen on an IBM PC with a color monitor, with the colors represented by various shades of gray (actually, LCD intensities) and with better resolution (640 by 200 pixels as opposed to the IBM PC's 320- by 200-pixel four-color display). Quadram has even managed to permit a color character to be seen over a like-colored background by using contrasting shades of gray. On a PC, by comparison, red letters disappear when placed on a red background. However, like a PC with an IBM display board, the Datavue 25 does not allow underlining on screen, except with programs like Microsoft Word, which uses graphics to simulate underlining.

A compartment on the left side of the system unit accepts a 300/1200-baud internal modem. The Datavue 25's AC power supply or optional rechargeable battery fits into another special compartment, which is foolproof: the battery will go in only one way. The AC power supply can fully charge the battery pack in about 3 hours.

Desktop Power

The Datavue 25 uses an 80C88 microprocessor, the low-power CMOS version of the widely used 8088 family. For now, at least, the machine uses standard memory chips, not low-power CMOS versions. The advantage of this choice is that the basic 128K-byte machine can be easily and inexpensively upgraded

How Do I Choose the Right Personal Computer Monitor?



POPULAR REVIEWS HARDWARE

by the owner—without the risk of static electricity damage that haunts CMOS chips.

All of the RAM is mounted on a single, easily accessible board that fits into a special slot in the upper left side of the computer. You can expand the system up to 640K bytes. The dip switches allocating the RAM to the computer are just inside the memory compartment. The machine I tested came complete with 640K bytes of RAM.

As soon as you turn on the machine, a screen appears that allows you to divide the available memory into whatever combination of user RAM and virtual disk in RAM you want. With the virtual disk set to its maximum of 360K bytes, 280K bytes remain as user RAM. This arrangement will permit most programs that require two disk drives to run

properly on the Datavue 25 with only one disk drive.

Unfortunately, the regular memory chips, in combination with the power requirements of the 5¼-inch drive, restrict the Datavue 25 to about 3 to 5 hours of operation on a single battery charge, assuming moderate use of the disk drives. If Quadram had used 3½-inch drives and CMOS memory chips, the operation time on a full battery charge could have increased to as much as 7 or 8 hours, but IBM PC compatibility would be reduced by the smaller drive.

PC Brother

In pairing a version of the 8088 as its central processing unit with a standard 5¼-inch double-sided disk drive, Quadram has achieved operational compatibility with the IBM

PC. In most cases you should be able to take a program disk out of an IBM PC and slip it into the Datavue 25 with favorable results.

In my tests, the Datavue 25 ran such compatibility touchstones as Flight Simulator, Lotus's 1-2-3, and Microsoft Word right out of the chute. Other programs that loaded successfully include such heavy hitters as dBASE III, Wordstar, Multi-mate, Multiplan, Samna III, Microsoft Chart, and PFS:Write. The Datavue 25 designers obviously spent a great deal of time getting the BIOS (basic input/output system) of their machine to emulate that of the IBM PC.

While size limitations prohibit expansion slots in a portable, Quadram plans to offer an IBM PC-compatible expansion chassis. According to Quadram, this option will include five full-length expansion-card slots, another floppy-disk drive, a 10-megabyte hard-disk drive, and an independent power supply. The expansion chassis will allow use of most IBM PC-compatible expansion cards, including coprocessor boards and the newer high-resolution color boards for driving an external monitor.

Lessons Not Learned

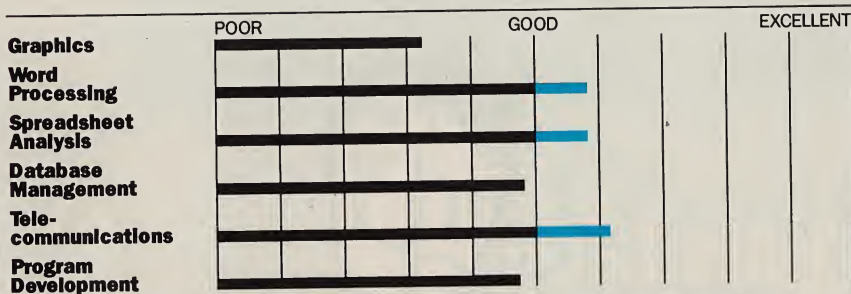
The Datavue keyboard has 82 full-travel keys, including 10 gray function keys and a separate numeric keypad. With all the juggling required to fit 82 keys in such a small space, Quadram strangely chose to follow the IBM PC's misplacement of the left shift key. Even IBM has finally gotten the message and copied its own Selectric typewriter keyboard on its new AT and PCjr models.

But the Datavue 25's keyboard has bigger problems. Each key gives considerable resistance at the beginning of key travel; touch-typists will find keyboard input on the Datavue 25 measurably slowed.

To make matters worse, Quadram opted to use an infrared link between the keyboard and the system unit. I'm convinced that this is more a gimmick envisioned as a sales ploy than a real benefit. The keyboard must be essentially on the same

AT A GLANCE

The Datavue 25



Reviewer's Note:

A cost-effective true portable highly compatible with the IBM PC, the Datavue 25 offers virtually the full power and flexibility of a desktop computer at about one-third the weight and size. Its relatively readable screen puts this machine a notch above most of today's new LCD portables

Manufacturer: Quadram Corp., 4355 International Blvd., Norcross, GA 30093; (404) 923-6666

Standard Features: 4.77-MHz 80C88 microprocessor; 82-key infrared full-travel keyboard including 10 function keys and integral numeric keypad; 128K bytes of user RAM; tiltable, variable-intensity 80-column by 25-line LCD with multiple gray-scale graphics resolution of 640 by 200 pixels; double-sided, double-density 5¼-inch floppy-disk drive storing 360K bytes; MS-DOS 2.0; parallel port; serial port; external bus expansion port; external floppy-disk drive connector; internal compartment for modem; removable, internal AC adapter; keyboard cable; built-in carrying handle

Dimensions: 10½ by 12¾ by 6¼ inches. Weight: 14.1 pounds including internal AC adapter

Base List Price: \$2195 with one disk drive and 128K bytes of RAM

Options: External floppy-disk drive with power supply (\$475); expansion chassis that houses a power supply, another floppy-disk drive, a 10-megabyte hard-disk drive, and five IBM PC-compatible expansion I/O slots (price not available at press time); soft carrying case (\$50); internal battery pack (\$65); 300/1200-baud internal modem (price not available at press time); car adapter (\$50)

level as the system unit and pointing toward it. Although an indicator light on the keyboard tells you when a key is properly depressed, occasionally you have to press a key a second time for it to register with the system unit. Thankfully there is an alternative. Quadram wisely includes a connecting cable for the keyboard, which permits you to operate it from your lap without any concern for proper alignment with the system unit.

Disk Drives

The Datavue's IBM PC-compatible 5¼-inch disk drives are a welcome addition. Most high-power portables come with 3½-inch disk drives—if they come with any drives at all. Some of the newest machines do not even include drives in the system unit; you must either connect the portable to a desktop computer or purchase a separate disk drive unit.

The drive installed in my evaluation machine had a prominent rectangular push-button latch to secure the disk in position and to eject it. When a disk is in the drive, the button locks flush with the drive face plate. When no disk is in the drive, however, the button extends about half an inch out from the side of the machine—just enough to snag your clothing as you carry it. The solution is to hang on to the cardboard drive protector that comes in the disk slot. This can be locked in like a disk, and it will also help to protect the drive during transit. Quadram, in fact, recommends this procedure.

The Better Mousetrap

There have been several valiant efforts to produce a truly portable computer with desktop power, each burdened with its own idiosyncrasies and shortcomings. And a fair number of lightweight transportables attempting to hybridize portable and desktop systems are available.

The Datavue 25 costs a little less than most popular IBM PC-compatible transportable and portable computers, and it offers a lot for the money. Despite a lower-than-average screen contrast (typical of the cur-

Will It Work with My PC?

Before you can experience the full capabilities a high performance monitor offers, it has to work with your personal computer. That's why Princeton Graphic Systems makes high resolution monitors compatible with most popular brands of personal computers. IBM, Compaq, Corona, Apple and more. But we go one step further. By paying close attention to ergonomic detail, we make Princeton Graphic Systems monitors compatible with you, the computer system user...



POPULAR REVIEWS HARDWARE

rent state of the art in LCD technology) and a keyboard that requires extra typing pressure, the Datavue 25 can do virtually everything a desktop computer can do.

It is truly a cost-effective alternative to other full-power portables. In-

deed, Quadram's new offering, the versatile Datavue 25, is evidence that the portable computer is finally coming of age.

—DAVID C. KEITH

David C. Keith is a freelance writer living in Santa Cruz, California.



The NEC Starlet

*NEC's second-generation
portable offers unparalleled power*

In the beginning was the portable, and the portable was with Kyocera, and the portable was Kyocera...

That's how things stood in 1983 when the Tandy Model 100, the NEC 8201A, and the Olivetti M10, all manufactured by Kyocera in Japan, began demonstrating the virtues of portability to the computing public. Of the three, only Tandy and NEC have stayed the course, bringing out newer portables—the Tandy

Model 200 and the Starlet from NEC.

The Starlet, also known as the 8401A, is the successor to NEC's first portable, and many changes have been made. Its 16-line by 80-column LCD replaces the 8-line by 40-column display of its predecessor. The new system has more RAM and ROM and a built-in 300-baud modem. Also, NEC has retired the "invisible operating system" used in its first portable and installed CP/M.

In fact, NEC completely deserted Microsoft, developer of the operating system and built-in software in its first portable, and teamed up with Micropro to provide Wordstar-To-Go, Calc-To-Go, Telcom, and Personal Filer. Other differences include a power supply made up of four "C" cell batteries instead four "AA" cells. And NEC is offering an attractive set of expansion options, including a 1200-baud modem.

Powerful Hardware

At face value, the changes make the Starlet the most powerful portable computer in its price range. But does this power negate the easy-to-use attractiveness that made the first-generation Kyocera portables successful?

The hardware is a mixed bag. The keyboard has a solid feel, but it is noisy. The letter, number, and punctuation keys are in standard locations. There are five function keys, and a second set of functions is available in some applications by pressing the Shift key. A Num key creates a numeric keypad with the keys on the right side of the keyboard—much like NEC's first portable.

The LCD in the Starlet is the largest offered in an under-\$1000 portable. But if the Starlet's display represents the best that current technology can do with 16 lines and 80 columns, then the industry should be rethinking its more-text-is-better attitude. The Starlet's LCD is difficult to read. In room light, no matter how much I fiddled with the control on the right side of the machine, the screen lacked sufficient contrast. To their credit, however, the designers at NEC managed to squeeze 16 lines on the Starlet's 7¾- by 2½-inch screen, but they did it with a shoe-horn. The lines are so cramped that an *h* on one line will hit a *p* on the line above it.

And then there's the main character set, which adds to the illegibility of the screen. The combination of thick and thin lines used in this character set jars the eye. By using Alt and Shift-Alt key combinations, you can access two additional

character sets. The Alt combinations provide the Greek alphabet and mathematical symbols; the Shift-Alt combinations provide graphics symbols.

According to NEC four alkaline "C" cell batteries will power the Starlet for 8 hours, and four normal "C" cells will last 3 hours. When battery power is low, an indicator light warns you. NEC says that when the light comes on you should have about an hour's power left with alkalines and 30 minutes' worth with regular batteries, but I found that when the light comes on you're through computing until you get a new set of batteries; the screen goes blank and stays blank.

Also I observed that the batteries were noticeably drained even when the machine was off. After installing fresh alkaline batteries and using the Starlet for about 15 minutes, I turned off the machine and did not use it again for about three days. By that time the low-battery light was on. This machine is definitely a power hog, and it should be leashed to an AC adapter (which must be purchased separately for \$20) whenever possible.

Perhaps the Starlet's most curious feature is its "sleep mode." You can set a "wake-up" time for the Starlet, put the machine in sleep mode, and turn it off. An indicator light remains lit while the computer is in limbo. NEC says the computer draws less power biding its time this way than when it's on, but 10 times more power than if it were completely off. At the appointed hour, the machine will turn itself on.

However, NEC doesn't explain why you would want your computer to wake itself up, and given the software in the basic bundle (Wordstar-To-Go, Calc-to-Go, Telcom, and Personal Filer), the usefulness of this feature eludes me. If you could set the computer to wake itself up and remind you of an appointment, this feature could be valuable. But an appointment program or other time-management software is not included.

Other hardware aspects of the Starlet include a CMOS micropro-

Does It Give Me A Bright, Sharp Image?

Take a close-up look at the display. Bright, crisp characters and sharp, colorful graphics mean you're getting a high-quality image. The kind of image that comes with every Princeton Graphic Systems' monitor. Because Princeton Graphic Systems combines flicker-free technology, a fine dot pitch, and a nonglare screen to give you an image that *PC World's* World Class Survey rates number 1 . . .



POPULAR REVIEWS HARDWARE

cessor that is compatible with the Z80, a Centronics-compatible parallel printer port, an RS-232C port, a 300/1200-baud modem switch for the optional 1200-baud modem, a phone jack, and a cassette interface that lets you save files on tape at 600 and 1200 baud. There's no explanation why you would want to use the slower speed. Unlike its predecessor, the Starlet doesn't have a bar-code port or ROM expansion socket.

For customers looking to expand the capabilities of the Starlet, NEC plans to sell a CRT/disk adapter that allows the machine to use a monochrome or RGB monitor and a portable 3½-inch microfloppy disk unit with a capacity of 320K bytes.

NEC heeded the hue and cry of portable owners for "more memory" by including 64K bytes of RAM and 96K bytes of ROM. These specifications beat those of any other machine in the under-\$1000 niche. A 32K-byte RAM cartridge (an out-

standing idea carried over from the 8201A) is offered as an option. The cartridge plugs into a slot on the left side of the machine—the same slot the Starlet's CRT/disk interface or 1200-baud modem would plug into. However, only one device may occupy the slot at one time.

The Starlet has two operating modes. The "true portable mode" makes 31K bytes available as a RAM disk for up to 31 files. (Operation of the portable's built-in programs eats up 32K bytes of RAM.) Another mode, aptly called "CP/M," lets you use the machine's entire 64K bytes of RAM to run CP/M programs, which can be loaded from the optional disk-drive unit.

Portable CP/M

While the Starlet's operating system is always CP/M, in true portable mode it displays a menu, similar to those in other portables, in the top half of the screen. The lower half displays CP/M prompts and com-

mands. To use one of the built-in programs listed in the menu, you just move the cursor over the program and hit enter twice.

The menu maintains some of the ease of use established by earlier portables, translating entries into CP/M commands. Not all CP/M commands and utilities, however, are available in the Starlet. Among the missing are the CP/M assembler and other commands useful in program development—important omissions in that the Starlet does not include BASIC.

And several commands in the Starlet's CP/M vary from the standard version of the operating system. For example, the command for transferring files from one device to another, PIP, requires that arguments be specified every time it is used, and when copying files, the backup file must have a different name than the original—which could become very confusing.

If all this sounds like mumbo-jumbo, don't worry. You can run the Starlet's built-in applications without mastering CP/M. However, that doesn't mean you don't have to learn some arcane command structures in the built-in software.

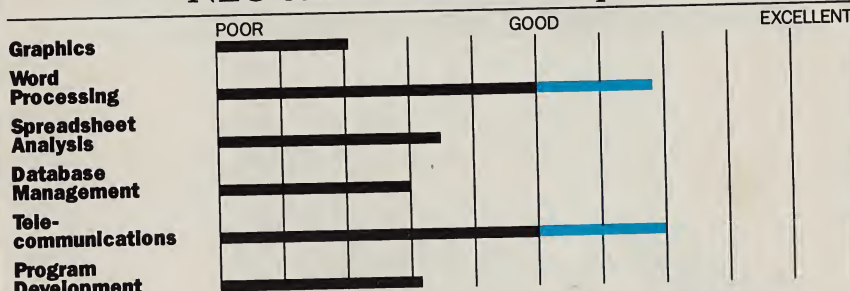
Wordstar-To-Go, for example, is a complex word-processing program. For the most part, Wordstar functions are performed through control-key combinations. For example, to save a file and return to the opening Wordstar menu, you press Control-K-D. The function keys act as shortcuts to some key combinations. Still, Wordstar-To-Go isn't easy to learn, but it is a powerful tool for the Starlet, should anyone want to do heavy-duty word processing on a portable.

For anyone wanting to use the Starlet for spreadsheet work, the system contains Calc-To-Go. Overall, Calc is easy to use and adequate for most portable spreadsheet applications. It lets you build spreadsheets of up to 63 columns and 256 rows, and it can store spreadsheets in DIF (data interchange format) files for use by Visicalc on a desktop system.

A third program in the Starlet is Telcom. You can use it to dial the

AT A GLANCE

NEC Starlet Portable Computer



Reviewer's Note: The NEC Starlet is the most powerful portable computer for less than \$1000 I've seen to date

Manufacturer: NEC Home Electronics (U.S.A.), 1401 Estes Ave., Elk Grove Village, IL 60007; (312) 228-5900

Standard Features: 16-line by 80-character LCD, 64K-byte CMOS RAM, 96K-byte ROM, CP/M 2.2-compatible operating system, Wordstar-To-Go (word-processing program), Calc-To-Go (spreadsheet), Filer (file management database), Telcom (telecommunications), 68-key keyboard, 5 function keys, expanded character set (includes Greek alphabet, mathematical symbols, and graphics symbols), integrated numeric keypad, low-battery and "sleep" LEDs, RS-232C port, 300-baud modem, cassette interface, Centronics-compatible printer port, and system slot for optional expansion devices

Dimensions: 12 by 8½ by 2½ inches Weight 4.7 pounds

Base List Price: \$999

Options: 32K-byte RAM cartridge (\$199), CRT/disk drive adapter (\$249), 3½-inch disk drive (\$599), second 3½-inch disk drive (\$299), 1200-baud modem cartridge (\$299), AC adapter (\$20)

telephone, communicate with an on-line database, or transfer data between computers. For telephone work, Telcom uses the Starlet's built-in 300-baud modem. A cord for connecting the computer to the telephone is included.

You can select the communications parameters for Telcom from a menu. The menu options offer several useful features, including port selection (RS-232C or built-in modem), speed (from 150 to 9600 baud), word wrap, dialing pulse rate, storing data in RAM or directly to a disk file, and MODEM7 protocol. The MODEM7 is a particularly nice feature. This error-checking protocol automatically ensures the accuracy of what you send and receive, providing that the computer you're communicating with recognizes the protocol.

When Telcom dials a number, you can choose voice or data communications. Automatic log-on sequences can be created in a separate file for time-saving interfacing with an on-line network. (Introductory offers for the Official Airline Guide and Dow Jones News/Retrieval come in the box with the basic unit.) You can also access the Starlet's directory while on-line, an important feature if you're transmitting several files.

For direct communications with another computer, you need a null-modem cable. NEC offers the cable as an option, but the manual includes the wiring scheme for the adventuresome wishing to make their own. Detailed instructions for connecting the Starlet to the IBM PC, Apple IIc, and Digital Equipment Corp. VAX are also included. Certainly, NEC has done its homework in the telecommunications area. Telcom does everything an average person would want to do with computer communications.

The last program to consider in the Starlet is Personal Filer, a simple file management program that has the added ability to dial a phone number (only at a relatively slow rate of 10 pulses per second; other portables dial at 20 pps) directly from a record. Like many other file managers, Filer uses the index card analogy. The program provides you

How About Dependability?

You rely on your personal computer system to help get your work done. That's why it's important to choose a monitor built for reliability. Princeton Graphic Systems monitors are built under the highest quality control standards, backed by a full one-year warranty and supported by a nationwide service network.* The result: monitors that perform when you need them, day in and day out . . .

*Bell & Howell, Xerox, MAI Sorbus Service and Princeton Graphic Systems.



with a blank "card." Each card can contain up to 13 lines, 80 characters long, and more than one field can be placed on a line. The card file can store up to 23K bytes of data. However, if each card uses 10 lines with 40 characters on a line, the file will hold only about 50 records.

Yet Filer is a simple and straightforward program that gives you maximum flexibility in creating records. You can sort files alphabetically on any field, edit or delete records, search any field for a string of characters, and "thumb" through it backward and forward using the cursor keys.

Features for Your Money

While the software in the Starlet is more powerful than anything I've encountered in similar portables, I missed having BASIC and some kind of time-management software in the machine. Of course, no matter what major applications a manufacturer includes in a portable, someone always wants something that's not provided by the built-in programs. In other portables, that's where BASIC comes in handy; you can write your own software, as needed. The promise of CP/M disk-based software is nice, but the ability to create simple programs without shelling out more cash is nicer.

Without a doubt, the Starlet offers more for the buck than any other portable computer currently on the market, although I wonder if NEC was intent on piling up features rather than analyzing needs. The Starlet has a bigger screen than other under-\$1000 portables, though its legibility is questionable. It has more memory, but it takes more memory to run its built-in programs. It even includes Wordstar and CP/M, but both are complex and difficult to learn.

The elegant, albeit simple, mesh of functions in the Kyocera machines is missing here. But the power of the Starlet can't be denied. And power, not elegance, will sell this machine.

—JOHN P. MELLO JR.

John P. Mello Jr. is a freelance writer living in Malden, Massachusetts, and former editor of *Portable 100* magazine.



The NCR PC4

NCR's new personal computer is IBM PC-compatible with a difference

The first personal computer from NCR Corp., the Decision Mate V (see *Popular Computing*, January 1984), bridged the gap between CP/M- and MS-DOS-based computers by using multiple microprocessors. Such versatility, however, did not make the machine wholly compatible with the IBM PC and the many software packages created for it.

NCR is now addressing that incompatibility with its new PC4. Not only does it run virtually any software developed for the IBM PC, it also uses the same expansion boards—making the PC4 operationally compatible. And it has some interesting features that make it easier to use than many IBM PC compatibles available today.

The basic system, with two 360K-byte floppy-disk drives, a monochrome display, 128K bytes of RAM, and printer and serial ports, lists for \$2825. This price also includes NCR-DOS (a version of MS-DOS 2.1) and GWBASIC. A PC4 equipped with 256K bytes of memory costs \$180 more.

Familiar Hardware

The PC4's cabinet resembles NCR's first personal computer and, ironically, an IBM mainframe computer terminal. The desktop footprint is somewhat smaller from front to back than that of an IBM PC, leaving more open work space on your desk.

The cabinet houses the power supply, disk drives, video display, and circuit boards. The only separate component is the keyboard, which is connected to the rear of the unit by a coiled cable. When not in use the keyboard can be stored in a recess under the front of the cabinet. Unlike some other systems, this recess is high enough to permit storage of the keyboard with its legs fully extended—a nice touch.

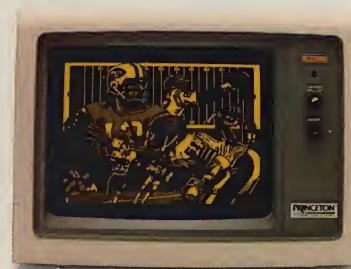
The keyboard has 95 keys arranged in a layout similar to that of an IBM PC. However, NCR has made a couple of improvements to that basic design. The Caps Lock and Num Lock keys have indicator lights that tell you when they are in use. And NCR has added a cursor-control key cluster, which avoids

Meet The Princeton Graphics Systems Family.

The right monitor at the right price. Princeton Graphic Systems offers you a complete family of high performance personal computer monitors. Monitors that deliver the compatibility, resolution, and reliability you need for any application and any budget: from word processing to sophisticated business graphics.



HX-12E. High resolution RGB monitor -Compatible with IBM Enhanced Graphics Adapter -Nonglare screen -**\$785**



MAX-12. Amber monochrome -720 x 350 lines -Enhanced to interface with IBM color or monochrome adapter card -Nonglare screen -Can display 16 shades of amber -**\$249**

HX-12. High resolution RGB monitor -690 x 240 lines noninterlaced -.31 mm dot pitch tube-Nonglare screen -**\$695**



HX-9/9E. Nine inch, high resolution RGB monitor -.28mm dot pitch tube - 9E compatible with IBM Enhanced Graphics Adapter -Nonglare screen -Green/amber switch -Apple/IBM colors - Etched dark glass screen -**\$650/\$750** (9E)



SR-12P. PGS's top of the line RGB monitor - Analog input allows for the display of 4,096 possible colors - Compatible with IBM Professional Graphics Adapter - Nonglare screen -**\$999**



SR-12. Super-high resolution RGB monitor -690 x 480 lines noninterlaced -.31 mm dot pitch tube - Nonglare screen - Requires interface card -**\$799**



Princeton accessory product line. Undergraduate tilt/swivel monitor base, ColorView card, Green/Amber switch, RGB-80 card and Scan Doubler card.

Princeton Graphic Systems. The only real choice.

For office or home use, Princeton Graphic Systems has a monitor that's right for you. Inquire at your local computer store about our complete line of high resolution color and monochrome monitors; monitors that live up to the Princeton Graphic Systems' tradition of quality, performance, and value. **Princeton Graphic Systems.** 601 Ewing Street, Bldg. A, Princeton, N.J. 08540. (609) 683-1660 Telex: 821402PGSPRIN **(800) 221-1490.** Ext. 503

PRINCETON
GRAPHIC SYSTEMS
AN INTELLIGENT SYSTEMS COMPANY

IBM IBM Enhanced Graphics Adapter, and IBM Professional Graphics Adapter are trademarks of International Business Machines, Inc. Compaq is a trademark of Compaq Computer Corp. Corona is a trademark of Corona Data Systems, Inc. Apple is a trademark of Apple Computer Corp. PC World is a trademark of CW Communications Inc.

POPULAR REVIEWS HARDWARE

problems caused by using the numeric keypad for both numeric entries and cursor movement.

The PC4 is available with either a monochrome (green) monitor or an RGB color monitor. You can upgrade a monochrome PC4 to color by adding a color graphics adapter board and an external monitor, but the price for a system equipped with a color monitor is only \$474 more than for a monochrome system. If you are thinking of starting with monochrome and later upgrading to color, you would do well to purchase the color system initially, saving several hundred dollars.

Inside the system cabinet are five expansion-board slots: four that accept full-size boards (up to 13 inches long) and one that accepts shorter boards (up to 10 inches long). The machine comes with at least two of the slots occupied. The video display interface board occupies one of the long slots and the floppy-disk controller board occupies the short slot. Because the main circuit board can hold 256K bytes of memory, there

are enough slots left to bring the machine up to its full memory capacity (640K bytes), add a hard-disk controller board, and still have a slot left for further expansion. NCR offers a 64K-byte memory expansion board (\$260), which can be further expanded in 64K-byte increments (\$90 each) up to 384K bytes.

The PC4 can use most expansion boards designed for the IBM PC. However, not all available boards have been tested, and there is at least one known incompatible board, Quadram's Quadlink, which allows IBM PC-compatible machines to run Apple II software. NCR says it is investigating this situation with Quadram.

Easy Starting

When setting up the PC4, you first encounter the *Getting Started* booklet. This brief (8-page) introduction tells you enough to get the machine running and also contains a tutorial program on disk called NCR Pal, which explains the fundamental operations of the sys-

tem. This interactive tutorial was the first clue to the PC4's chief claim to individuality—it is obviously designed for first-time users. The Pal program introduces hardware such as the keyboard, video monitor, and floppy-disk drives. Another tutorial program teaches the fundamentals of NCR-DOS. All the material in the two tutorials is also covered in the various manuals supplied with the machine, but anyone new to computers or MS-DOS will appreciate the structured dialogue NCR has developed.

More examples of the PC4's easy-to-learn design are found on the NCR-DOS disk. First, it's permanently write-protected—in fact, you cannot do anything that would cause the machine to write data or destroy the files on this disk. Whenever you boot the system with the NCR-DOS disk in drive A, it immediately executes a program that helps you make a backup copy of that disk. The program even instructs you to remove the original and use the newly made copy.

All computer manufacturers advise you to make working copies of the operating system and store the originals for safekeeping. But NCR goes a step further with its automatic backup program—lessening the chance of damaging the original disk and conditioning the user to making backup copies.

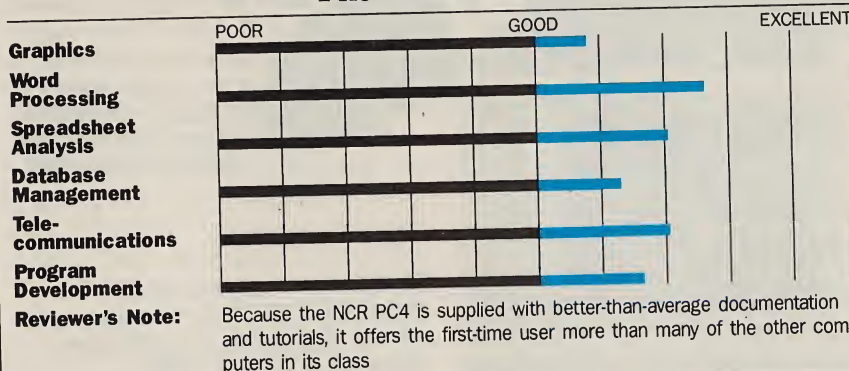
Second, the NCR-DOS disk contains a help file that provides on-line help for 36 operating system commands. You select the command you need help with from a menu, and the system immediately displays the proper syntax for that command. Another keystroke gets you detailed information about that command.

Superior Manuals

NCR also provides three other manuals with the machine. These are the *Owner's Manual*, the *NCR-DOS Manual*, and the *GWBasic Manual*. These are the best manuals I have seen for any MS-DOS computer. They're not full of intimidating jargon, and yet they provide complete information. Even IBM could learn from NCR's efforts.

AT A GLANCE

The NCR PC4



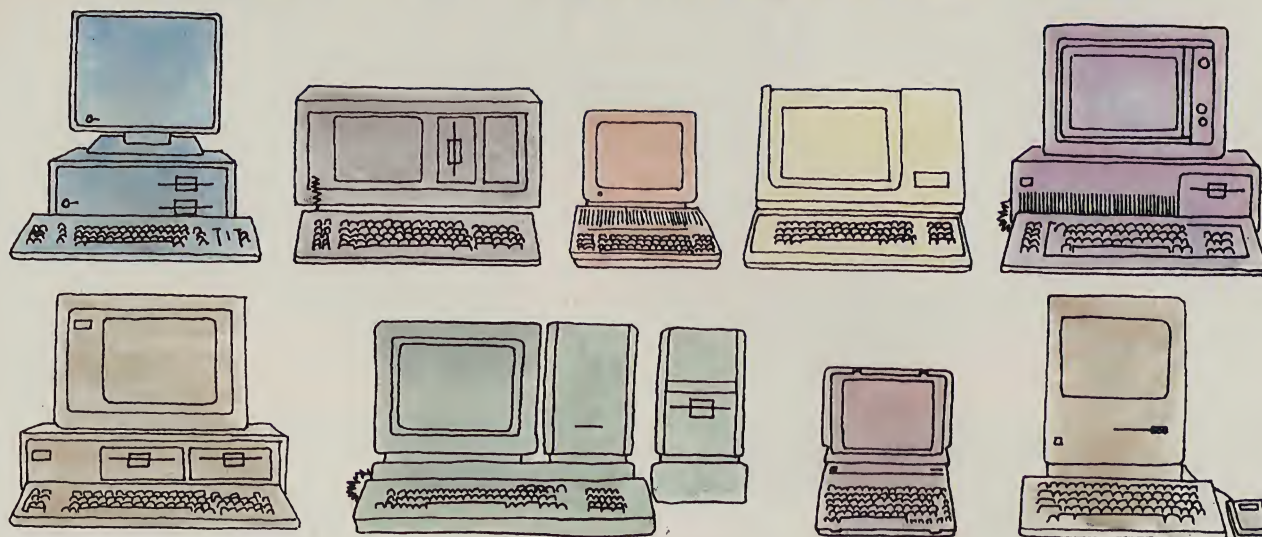
Manufacturer: NCR Corp., POB 606, Dayton, OH 45401; (800) 222-1235

Standard Features: Intel 8088 16-bit microprocessor operating at 4.77 MHz; Centronics-compatible printer port; RS-232C serial port; two 360K-byte floppy-disk drives; green-phosphor monochrome monitor with 25-line, 80-character display; 128K bytes of RAM expandable internally to 256K bytes; 5 expansion-board slots; 95-key detached keyboard with separate cursor-control key cluster, numeric keypad, 10 function keys, and indicator lights on Num Lock and Caps Lock keys; NCR-DOS (a version of MS-DOS 2.1); GWBASIC; Pal and NCR-DOS tutorials on disk

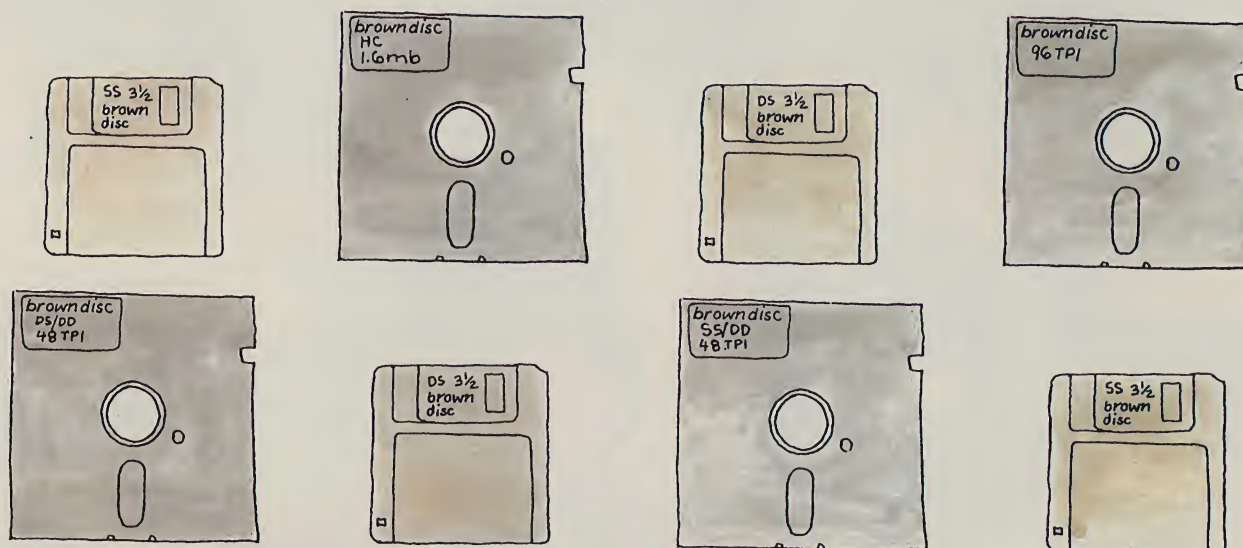
Base List Price: \$2825

Options: Memory expansion board, which holds up to 384K bytes in 64K-byte increments (\$260); NCR PC2PC local network (\$495 per connection); color graphics adapter board (\$240)

HIGH PERFORMANCE PCs



REQUIRE



HIGH PERFORMANCE FLOPPIES

Brown Disc manufactures high performance media compatible with the new IBM AT™, Data General One™, and Apple Macintosh™ personal computers. In fact, our line of high-capacity 5 1/4" and 3 1/2" Discs exceeds the manufacturer's specifications for these machines.

Our 1.6 megabyte Disc is the new standard of performance in the floppy diskette industry and was developed long before the introduction of the IBM AT™.



Our complete line of flexible media is manufactured under the industry's strictest quality control standards and backed by a lifetime warranty. This consistent high performance guarantee represents real value no matter which model computer you use.

Maximize the potential of your system. Ask your dealer for the high performance floppies from Brown Disc or call John Boyd toll free at 1(800) 654-4871 for the Brown Disc dealer nearest you.

brown disc

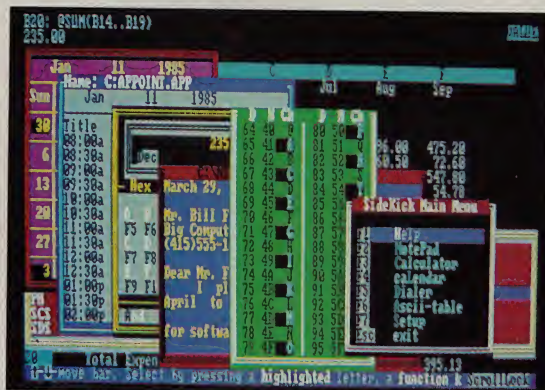
1110 Chapel Hills Drive Colorado Springs, CO 80918 (303)593-1015 Telex 450827

SIDEKICK



Borland's SideKick Software Product of the Year*

SideKick is InfoWorld Software Product of the Year. It won over Symphony. Over Framework. Over ALL the programs advertised in this magazine. Including, of course, all the "fly-by-night" SideKick imitations. **SideKick . . . Simply the best.**



Here's SideKick running over Lotus 1-2-3. In the SideKick Notepad you'll notice data that's been imported directly from the Lotus screen. In the upper right you can see the SideKick Calculator.

All the SideKick windows stacked up over Lotus 1-2-3. From bottom to top: SideKick's "Menu Window", ASCII table, Notepad, Calculator, Appointment Scheduler/Calendar, and Phone Dialer. Whether you're running WordStar, Lotus, dBase, or any other program, SideKick puts all these desktop accessories instantly at your fingertips.



InfoWorld Report Card 1984 by Popular Computing, Inc., a subsidiary of CW Communications Inc. Reprinted from InfoWorld, 1060 Marsh Road, Menlo Park, CA 94025.

Jerry Pournelle, BYTE: "If you use a PC, get SideKick. You'll soon become dependent on it."

Garry Ray, PC Week: "SideKick deserves a place in every PC."

Charles Petzold, PC Magazine: "In a simple, beautiful implementation of WordStar's block copy commands, SideKick can transport all or any part of the display screen (even an area overlaid by the notepad display) to the notepad."

Dan Robinson, InfoWorld: "SideKick is a time-saving, frustration-saving bargain . . ."

BORLAND INTERNATIONAL Software's Newest Direction
4585 Scotts Valley Drive
Scotts Valley, CA 95066
TELEX 172373

Symphony, Lotus & Lotus 1-2-3 are trademarks of Lotus Development Corp. dBase & Framework are trademarks of Ashton-Tate. WordStar is a trademark of Micropro International Corp. SideKick is a trademark of Borland International.

*Selected by InfoWorld as the most significant software product of the year.

NOT COPY-PROTECTED

SIDEKICK

Available at better dealers nationwide. Call (800) 556-2283 for the dealer nearest you. To order by Credit Card call (800) 255-8008, CA (800) 742-1133

Yes, I want the Best.
Please send me SideKick!

SideKick Copy Protected
Quantity: _____ at \$54.95
(CA res. add \$3.30 tax per copy)

SideKick Not Copy-Protected
Quantity: _____ at \$84.95
(CA res. add \$5.10 tax per copy)

Amount: (CA 6% tax) _____

Payment: VISA MC BankDraft Check

Credit Card Expir. Date: _____

Card #: _____

Name: _____

Shipping Address: _____

City: _____

State: _____ Zip: _____

Telephone: _____

These prices include shipping to all U.S. cities. All foreign orders add \$10 per product ordered.

PCjr requires not copy-protected version

S40 COD's and Purchase Orders WILL NOT be accepted by Borland. California residents: add 6% sales tax. Outside USA: add \$10 and make payment by bank draft, payable in US dollars drawn on a US bank.

Software Compatibility

Most business users are concerned about a personal computer's ability to execute programs written for the IBM PC. But many MS-DOS-based computers fail to be software compatible because program developers generally bypass the operating system and program directly to the IBM PC's hardware.

These choices are usually made to speed up program execution (Lotus's 1-2-3 graphics software, for example, directly accesses the IBM PC's video display memory) or to implement copy-protection schemes. Some programs, such as Borland International's Sidekick, are designed to insert themselves into the operating system to make special features available no matter what other program may be running. Other programs, such as Microsoft's Flight Simulator, are designed to take advantage of software routines that exist at specific locations in the IBM PC's ROM.

To test software compatibility on the PC4, I tried running several programs written for the IBM PC, and I successfully booted the PC4 using IBM's PC-DOS version 2.1 disk. While using PC-DOS, I also loaded and ran Sidekick. Although I didn't try every possible command, I tried a selection that exercised the video display and read disk directories. Both PC-DOS and Sidekick functioned normally on the PC4.

Then I tried Microsoft's Flight Simulator. A game to some and a serious simulation program to others, Flight Simulator is a good test of both the display system and the low-level input and output routines in ROM. This program also functioned well, with good color and normal speed.

For disk format compatibility and speed comparisons, I transferred data files between the PC4 and IBM PC using floppy disks interchangeably. Then I simultaneously updated (recalculated) a deliberately complicated spreadsheet created with 1-2-3. The difference in speed between the two machines was negligible.

The IBM version of the CP/M-86 operating system, however, would

not run on the PC4, and NCR does not offer CP/M-86 for the PC4. But the number of applications written for that operating system is small, and the absence of CP/M-86 should not be a serious concern.

The Office Machine

In short, my tests showed the PC4 to be highly compatible with the IBM PC. But technically, the machine breaks no new ground—after all, it is merely *compatible*.

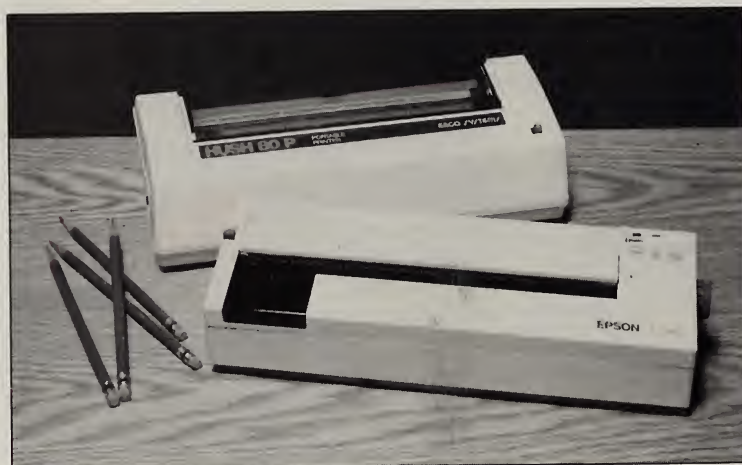
The PC4 is, however, a complete computer. Unlike most MS-DOS systems, the PC4's video display board, monitor, and the essential operating system (NCR-DOS) are included in the price of the machine. And its price is competitive. Equally important, the PC4 is backed by an extensive service network—a feature few

other compatible manufacturers can match.

But there is a stronger point in its favor. The PC4 shows particular attention to the needs of a first-time computer user through excellent documentation, a help file, and training programs. And in today's evolving office environment, that's important. The PC4 requires less training than other MS-DOS-based computers; therefore, it is well suited for any desk worker—not just the department manager. In fact, the NCR PC4 could easily join the typewriter and photocopier as the office machine that everyone uses.

—BRUCE WILLIAMSON AND
TY HALDERMAN

Bruce Williamson and Ty Halderman are consultants based in Houston, Texas, who specialize in custom software for microcomputers.



The Hush 80 P & Epson P-80

*Pack a portable printer for your next
business trip*

Portable computers are great for recording those good ideas generated in airports and hotels, and they can convert wasted hours to productive time. But when the computer's memory

fills up, your work can come to an abrupt halt until you have a chance to print out your text or data.

The Ergo Hush 80 P and the Epson P-80 are handy printers you can take with you without making a no-

With NRI training at home, you can...

Move up to a high paying career servicing computers



And you can start by actually building NRI's 16-bit IBM-compatible computer.

You can create your own bright, high paying future as an NRI trained computer service technician. The biggest growth in jobs between now and 1995, according to Department of Labor predictions, will occur in computer service and repair, where demand for trained technicians will double. There is

NRI Discovery Lab® and professional Digital Multimeter, that you keep.

You'll assemble Sanyo's intelligent keyboard, install the power supply and disk drive, and attach the high resolution monitor—all the while performing hands-on experiments and demonstrations that reinforce your skills.

with your current job. You'll learn at your own pace, in the comfort and convenience of your own home. No classroom pressures, no rigid night school schedules. You're always backed up by the NRI staff and your instructor, who will answer questions, give you guidance and be available for special

you need it. Others worry about computers in their jobs. With NRI training, you can have computers making your life easier. Find out more about these exciting jobs for you.

RUSH POSTAGE-PAID CARD FOR YOUR FREE CATALOG

- **COMPUTER ELECTRONICS** training prepares you to service and repair all computers as you build your own 16-bit IBM-compatible computer. Total system program includes disk drive, test equipment and NRI Discovery Lab.
- **TV/VIDEO ELECTRONICS SERVICING** includes training with 25" color TV, VCR, special lessons on videotape.
- **ROBOTICS** training features remote-controlled mobile programmable robot you build, experiment with and keep, along with other test equipment.
- **COMMUNICATIONS ELECTRONICS** training gives you skills to repair & install everything from microwave antennas to two-way radios, from radar sets to satellite systems, even cellular radio.
- **INDUSTRIAL ELECTRONICS** prepares you to service and maintain computer-controlled industrial systems. Training includes color computer, diagnostic equipment and NRI Discovery Lab.



CHECK ONE

- ☐ Computer Electronics
- ☐ Robotics Training
- ☐ TV/Video Electronics Servicing
- ☐ Digital Electronics
- ☐ Electronics Design Technology
- ☐ Industrial Electronics
- ☐ Data Communications
- ☐ Communications Electronics
- ☐ Telephone Servicing
- ☐ Basic Electronics
- ☐ Small Engine Servicing
- ☐ Appliance Servicing
- ☐ Air Conditioning, Heating, Refrigeration & Solar Technology
- ☐ Locksmithing & Electronic Security
- ☐ Building Construction & Remodeling
- ☐ Automotive Servicing

For career courses approved under G.I. Bill ☐ Check for details.

Name _____ (Please Print) Age _____
 Street _____
 City _____ State _____ Zip _____
 Telephone # _____

For Free NRI Catalog

Fill out the post-paid reply card today and receive a 100-page catalog, with all the information on computer training plus training in Robotics, Data Communications, TV/Video Servicing and other fields. If some other person beat you to the card, NRI will send you the catalog at the address below.

NRI SCHOOLS

International Continuing Education Center
 1400 Wisconsin Avenue, NW
 Washington, DC 20016



You Tomorrow.

Registered Trademark of International Business Corporation.

POPULAR REVIEWS HARDWARE

Software Compatibility

Most business users are concerned about a personal computer's ability to execute programs written for the IBM PC. But many MS-DOS-based computers fail to be software compatible because program developers generally bypass the operating system and program directly to the IBM PC's hardware.

These choices are usually made to speed up program execution (Lotus's 1-2-3 graphics software, for example, directly accesses the IBM PC's video display memory) or to implement copy-protection schemes. Some programs, such as Borland International's Sidekick, are designed to insert themselves into the operating system to make special features available no matter what other program may be running. Other programs, such as Microsoft's Flight Simulator, are designed to take advantage of software routines that exist at specific locations in the IBM PC's ROM.

To test software compatibility on the PC4, I tried running several programs written for the IBM PC, and I successfully booted the PC4 using IBM's PC-DOS version 2.1 disk. While using PC-DOS, I also loaded and ran Sidekick. Although I didn't try every possible command, I tried a selection that exercised the video display and read disk directories. Both PC-DOS and Sidekick functioned normally on the PC4.

Then I tried Microsoft's Flight Simulator. A game to serious simulation programs, Flight Simulator tests both the display and the low-level input and output routines in ROM. This program functioned well, with good normal speed.

For disk format comparison, I copied data files between the PC4 and an IBM PC using floppy disks interchangeably. Then I simultaneously recalculated a deliberately miscalculated spreadsheet created on the IBM PC. The difference in speed between the two machines was negligible.

The IBM version of the operating system, however,

not run on the PC4, and NCR does not offer CP/M-86 for the PC4. But the number of applications written for that operating system is small, and the absence of CP/M-86 should not be a serious concern.

The Office Machine

In short, my tests showed the PC4 to be highly compatible with the IBM PC. But technically, the machine breaks no new ground—after all, it is merely *compatible*.

The PC4 is, however, a complete computer. Unlike most MS-DOS systems, the PC4's video display board, monitor, and the essential operating system (NCR-DOS) are included in the price of the machine. And its price is competitive. Equally important, the PC4 is backed by an extensive service network—a feature few

other compatible manufacturers can match.

But there is a stronger point in its favor. The PC4 shows particular attention to the needs of a first-time computer user through excellent documentation, a help file, and training programs. And in today's evolving office environment, that's important. The PC4 requires less training than other MS-DOS-based computers; therefore, it is well suited for any desk worker—not just the department manager. In fact, the NCR PC4 could easily join the typewriter and photocopier as the office machine that everyone uses.

—BRUCE WILLIAMSON AND
TY HALDERMAN

Bruce Williamson and Ty Halderman are consultants based in Houston, Texas, who specialize in custom software for microcomputers.



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 10008 WASHINGTON, D.C.

POSTAGE WILL BE PAID BY ADDRESSEE

NRI Schools

McGraw Hill Continuing
Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016-9973



With NRI training at home, you can...

Move up to a high paying career servicing computers



And you can start by actually building NRI's 16-bit IBM-compatible computer.

You can create your own bright, high paying future as an NRI trained computer service technician. The biggest growth in jobs between now and 1995, according to Department of Labor predictions, will occur in computer service and repair, where demand for trained technicians will double. There is still plenty of room for you to get in on the action—if you get the proper training now.

Total computer systems training, only from NRI

To learn how to work on computers, you have to get inside one. And only NRI takes you inside a computer, with total systems training that gives you hands-on experience with computers, peripherals, and software. As part of your training, you'll build a Sanyo MBC-550-2, which experts have hailed as the "most intriguing" of all the new IBM-compatibles. The Sanyo even surpasses the IBM PC in computing speed and graphics quality.

Even if you've never had any previous training in electronics, you can succeed with NRI training. You'll start with the basics, rapidly building on the fundamentals of electronics until you master advanced concepts like digital logic, microprocessor design and computer memory. You'll probe into electronic circuits, using the exclusive

NRI Discovery Lab® and professional Digital Multimeter, that you keep.

You'll assemble Sanyo's intelligent keyboard, install the power supply and disk drive, and attach the high resolution monitor—all the while performing hands-on experiments and demonstrations that reinforce your skills.

Learn to service today's computers

As you complete your Sanyo, you grasp the "secrets" that qualify you for a new career. You'll learn to program in BASIC and machine language. You'll use utility programs to check out the operation of the Sanyo's 8088 microprocessor (the same chip used in the IBM PC). And you also get over \$1,000 worth of software, including WordStar and CalcStar.

Most importantly, you'll understand the principles common to all computers. Only a person who fully understands all the fundamentals can hope to be able to tackle all computers. NRI makes sure that you'll gain the knowledge and skills to maintain, troubleshoot and service computers.

Learn at home in spare time

With NRI training, you'll learn at home on your own time. That means your preparation for a new career or part-time job doesn't have to interfere

with your current job. You'll learn at your own pace, in the comfort and convenience of your own home. No classroom pressures, no rigid night school schedules. You're always backed up by the NRI staff and your instructor, who will answer questions, give you guidance and be available for special help if you need it.

Let others worry about computers taking their jobs. With NRI training, you'll soon have computers making good paying jobs for you.

Send for Free NRI Catalog

Send the post-paid reply card today for NRI's 100-page catalog, with all the facts about computer training plus career training in Robotics, Data Communications, TV/Video Servicing and many other fields. If some other ambitious person beat you to the card, write to NRI at the address below.

NRI SCHOOLS

McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue, NW
Washington, DC 20016

We'll Give You Tomorrow.



IBM is a Registered Trademark of International Business Machines Corporation.

A NEW LEGEND BEGINS.



INTRODUCING NEW KODAK DISKETTES.

For as long as anyone can remember, the world has trusted Kodak film to capture its memories. Now the world can trust legendary Kodak quality to capture its computer data.

Introducing Kodak diskettes. And the beginning of a new legend.

We know you expect nothing less than extraordinary performance from a Kodak product. We didn't disappoint you.

These remarkable new diskettes are so thoroughly tested, they're certified error-free.

Every Kodak diskette has a highly burnished head surface for optimum read-write accuracy. And every standard diskette is made to withstand 4½ million passes before significant wear occurs.

© Eastman Kodak Company, 1984

With accuracy and durability like that, we can offer this no-questions-asked replacement policy:

This KODAK Diskette will be free from manufacturing defects, or we will replace it.

Kodak diskettes for home and business PC use are available in standard 8- and 5¼-inch formats, high-density 5¼-inch diskettes, and 3½-inch micro diskettes in our HD 600 Series.

New Kodak diskettes. Because the only thing that can follow a legend is another legend.



KODAK.
The name says it all.



POPULAR REVIEWS HARDWARE

ticeable bulge in your briefcase. They're ideal for eliminating "out of memory" problems and for generating routine hard copy for notes, memos, and the files back home.

Neither printer is much bigger than a carton of cigarettes. The printers share several features; the obvious one is portability. Measuring only 2.5 by 11.75 by 4.25 inches, the Epson P-80 weighs 2.4 pounds. At just over a pound and a half, the Ergo Hush 80 P is a mere 2.8 by 11.6 by 5.5 inches. Both printers produce 5 by 7 dot-matrix standard characters plus condensed and expanded type. Both work with most portable computers and include fixed and dot-addressable graphics and eight international character sets.

The differences emerge when you consider flexibility and additional features. At \$160, and billed as the lowest-priced 80-column printer on the market, the Hush 80 P is a basic, no-frills machine. For \$250, the Epson P-80 provides useful additional functions.

Ergo Hush 80 P

The Hush 80 P combines compactness with simplicity. It has a power cord, a connector ribbon cable for your computer's parallel port, an off-on switch, and a lighted line-feed button. That's it. The 8½-inch roll of thermal paper rests in a compartment at the back of the case and operates by friction feed. I had the printer humming away about five minutes out of the box, possibly a new world record for computer peripherals.

And "hum" is the appropriate word for this quiet machine. Initially I wasn't sure it was printing, until the first line quickly popped up over the top edge of the case. The bidirectional printer is rated at 80 cps (characters per second); I timed its true speed (including paper and print-head positioning) at about 49 cps. I really didn't expect this speed and quietness in an inexpensive printer.

In addition, the Hush 80 P will print all 62 of the graphics characters on the Commodore 64 keyboard, and the CHR\$ codes for these are given in the back of the

manual. (The printer was originally designed for the Commodore and that version, the Hush 80 CD, is still available at \$140.)

You also can create your own graphics, and a chapter in the manual offers some sample programs. A second extra is reverse print, with white letters on a dark background—nice features for embellishing memos and notices.

The Hush 80 P has a Centronics-compatible parallel interface; the Hush 80 S, also for \$160, has an RS-232C serial interface with switch-selectable output pins. An optional \$30 rechargeable battery pack for all models provides up to an hour of printing per two-hour charge. The model I evaluated was 110V AC only—fine for hotel rooms but not for on the go.

The manual is straightforward and effectively illustrates printer functions with sample programs. As with most documentation, I would've liked more detail in spots—particularly on creating graphics and programming the computer for different printing modes.

It's always refreshing to test a product that performs as advertised.

AT A GLANCE

The Hush 80 P

Manufacturer:	Ergo Systems Inc., 26254 Eden Landing Rd., Hayward, CA 94545; (415) 786-3746
Standard Features:	80 cps print speed; 40, 80, or 160 characters per line; Centronics-compatible interface (system with RS-232C interface also available)
Base List Price:	\$160
Options:	Rechargeable battery pack (\$30)
Reviewer's Note:	A low-cost portable thermal printer that is fast, exceptionally quiet, and suitable for notes, memos, and casual correspondence

The Hush 80 P did just that; its thermal reproduction is better than some I've seen from full-size economy printers. In the complaint department, the descenders for such lowercase letters as *y* and *g* sit on the baseline instead of dropping below. This reduces readability. Also, the condensed type is thin and hard to read. Finally, the paper on my printer tended to bind toward the end of the roll. A paper release and an out-of-paper sensor would be good additions.

The company supplies thermal paper for the Hush 80 P at \$6.49 per 90-foot roll. The printer will use other thermal paper, but reproduction quality will vary.

The Epson P-80

The Epson P-80 is a dandy little portable with features rivaling those on full-size printers. It's also easy to get going, and it offers more options than the Hush 80 P. The manual is very good, with step-by-step instructions and illustrations.

A small control panel on top houses switches for power, printer on-line, and electric paper feed. Two more controls on the side vary copy

AT A GLANCE

The Epson P-80

Manufacturer:	Epson America Inc., 23530 Hawthorne Blvd., Torrance, CA 90505; (213) 373-9511
Standard Features:	45 cps print speed, 80 or 136 characters per line, RS-232C interface with 6-pin DIN connector, thermal ribbon, Epson PX-8-compatible character set
Base List Price:	\$250
Reviewer's Note:	A portable printer with many full-size features including italics, underlining, and a variety of type

darkness (you'll probably leave this at maximum) and adjust the printer for rough or smooth paper surfaces. Also included are a manual paper feed, a fold-up stand for sheets, a paper-release lever, and an out-of-paper sensor that stops the printer. You can use thermal or standard paper; you simply snap in a thermal-ribbon cartridge to use regular paper. Ribbon life is about 40,000 characters, or 20 pages of text.

The Epson P-80 operates on a built-in rechargeable nickel-cadmium battery pack. One charge is good for 60,000 characters, or some 30 pages. Charging time is 6 to 7 hours, but you can use the AC adapter if you don't have time to wait.

Rated at 45 cps, the Epson P-80 unidirectional printer is noticeably slower than the Hush 80 P; the one I tested had a true print speed of only 19 cps.

For a portable, the Epson P-80 offers an impressive variety of type and related features. In addition to pica, compressed, and expanded, you get expanded-compressed, along with italics in all four modes. You can vary appearance still more by using the double-strike mode. Also included are superscript, subscript, and solid and broken underlines. Further, the typefaces, including condensed, compare favorably with most dot-matrix printers.

The Epson P-80 also contains the set of 32 graphics characters used by the Geneva PX-8 portable computer and will print them in different pitches and weights. The manual gives excellent instructions for using the graphics characters as well as programming your own designs.

The printer comes with a 240-byte buffer and an RS-232C interface with a six-pin DIN connector. The manual includes instructions for operation with the Geneva, although the printer will work with other portables. An optional standard RS-232C cable is available.

Overall the Epson P-80 was a pleasing performer—I just couldn't find much to complain about. The printing speed would be frustrating on long documents, but that probably isn't a major consideration for

use with a portable computer. I did note that the P-80's ribbon is paper sensitive, despite the controls for varying copy darkness and paper surface. The lightweight, shiny paper supplied with the P-80 works best.

Which Is Better?

The answer to that question depends on your application and whether you want a basic printer or one with bells and whistles. The Hush 80 P is fine for notes, memos, and informal correspondence and also offers more graphics. The Epson P-80 is more flexible; you can print letters on your hotel stationery

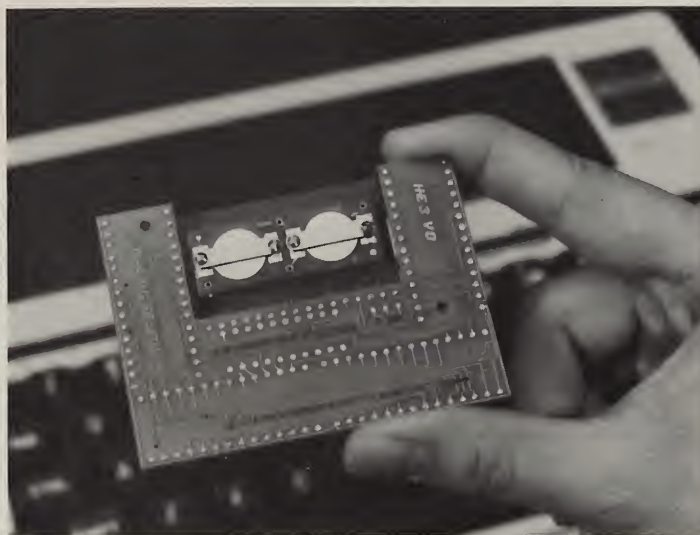
or dress up your business reports with italics, underlining, and a wide variety of type.

Print quality is similar. The Hush 80 P was better in the thermal mode, but the Epson P-80 excelled with the ribbon installed. Both printers are durable: I printed 10 single-spaced pages nonstop on each with no noticeable change in quality.

The Epson P-80 and the Ergo Hush 80 P are viable contenders in the portable printer market and are certainly worth considering.

—ROBERT D. SWEARENGIN

Robert D. Swearengin is a contributing editor of *Popular Computing*.



The PG Expansion RAM

Double your Model 100's maximum memory.

To own one is to love one. Barely past its second birthday, the Radio Shack Model 100 portable computer has become known as the "Swiss army knife of the mind" for writers, traveling busi-

nessfolk, and telecomputing addicts on nearly every continent. You might even say Tandy's Model 100 put portable computing on the map. But nothing's perfect.

The Model 100's Achilles' heel has

been its meager ration of internal memory. In practical terms, its maximum of 32K bytes of RAM means about 10 pages of single-spaced text, even less if you load in a sophisticated program (word processor, spreadsheet, and so forth). Most writing and business applications call for more elbow room in the memory department.

To help you over the Model 100's memory hurdle, a variety of memory expansion and mass-storage devices are available from third-party suppliers. But most of these violate the Model 100's simplicity (and charm) by adding significant weight and bulk and often by requiring you to learn a new operating system and new procedures.

The 32K-byte PG Expansion RAM, built by PG Design Electronics for the Model 100, is an elegant alternative to such clumsy attachments. Nestled out of the way in the Model 100's underside expansion compartment, and adding a mere ounce and a half of weight, this barely palm-sized unit doubles the Model 100's maximum memory to 64K without external boxes, cables, connectors, screws, clamps, or battery chargers and without a new operating system.

In fact, the PG Expansion RAM has to be the most "transparent" Model 100 upgrade of all. Once you've installed it, your new memory bank operates just like the original, giving you enough memory for about 10 additional pages of text. It's a little like having two 32K-byte Model 100s in the space of one, each with its own menu showing its files and how many bytes remain free. A bank-switching program supplied with the PG Expansion RAM lets you zip over to the new menu or back again using just a few keystrokes.

The solidly built expansion unit is about 2 by 3 inches across and about a half-inch thick. It consists of four low-power CMOS (complementary metal oxide) 8K-byte memory chips, some auxiliary chips and components, and a tiny twin battery compartment partially sandwiched between two circuit boards.

Fitting In

The PG Expansion RAM plugs directly into the Model 100's expansion port, which was designed primarily for connecting Tandy's Disk/Video Interface and other peripherals. The PG unit's bank-switching program takes advantage of that design to trick the computer's microprocessor into accessing the expansion RAM as if it were a continuously operating disk drive, bypassing the main internal memory bank.

An optional 1500-byte program transfers files from one bank to the other, letting you effectively manage your file space.

The PG Expansion RAM will not, however, work with the Model 100's computer cousins, the Olivetti M-10 and the NEC PC-8201A—even though they are all made by the same Japanese manufacturer. The expansion port schemes on the Olivetti and NEC machines differ markedly from the Model 100's.

MAIL ORDER PRICES !

A NEW KIND OF COMPUTER STORE — WE DISCOUNT EVERYTHING!

<p>APPLECAT II 209.95 APPLE WORKS 209.95</p> <p>APPLIED ENGINEERING Z-80 PLUS 4.0 CP/M 129.95 RAMWORKS IIc EXT 80 COL EXPANDS APPLEWORKS UP TO 1 MEG 64K 159.95 128K 189.95 256K 299.95 512K 419.95 DESK TOP EXP DISK 34.95 EXP. A.W. UP TO 800K W/ ABOVE CARD</p> <p>AMDEK 300 COLOR 249.95 AMDEK 300 AMBER 139.95 AST 6 PAK + 64K 249.95 64K UPGRADE 19.95 BANK STREET WRITER 49.95 BEAGLE GRAPHICS 49.95</p> <p>BORLAND INTERNATIONAL SIDEKICK 39.95 TURBO PASCAL 39.95 TURBO TOOL BOX 39.95 TURBO TUTOR 29.95 TURBO GIFT PAK/3 TURBOS 84.95</p> <p>COMPUERVE 26.95 COPY II AP/IBM/MAC 29.95 CUT THROATS 29.95 DIZZLE DRAW 36.95 DISK NOTCHER 12.95 D BASE II AP * 199.95 D BASE III IBM 399.95</p> <p>* DANA SUPER FAN 29.95 SURGE SUPPRESSOR, 2 GR. OUTLETS FRONT SWITCH FOR APPLE II, II+, IIc</p> <p>DB MASTER IV+ 189.95 DOLLARS & SENSE: APP. 69.95 MAC... 99.95 IBM... 109.95 FORECAST MAC 59.95 AP 49.95 FLIGHT SIMULATOR II 36.95 FONTPAK 1 THRU 11 EA. 19.95 FONTRIX IBM (COLOR) 99.95 FONTRIX APPLE (COLOR) 69.95 FORMAT II ENHANCED 99.95 FRAMEWORK 399.95 GRAPPLER+ INTERFACE 79.95 BUFFERED AFTER MFG'S \$20 REBATE GRAPPLER 64K 139.95 HAYES III JOYSTICK 39.95</p> <p>COLOR CARD 159.95 GRAPHICS CARD 299.95</p> <p>HEAD CLEANER KIT 8.95 1/2 HGT DRIVE II+, IIc 149.95 1/2 HGT DRIVE IIc 159.95 HITCHHIKER'S GUIDE 29.95</p>	<p>Hayes MICROMODEM IIc 239.95 SMARTMODEM 300 IIc W/SFTWRE 239.95 1200B (IBM w/SW) 369.95 1200 RS 232 399.95 2400 RS 232 599.95</p> <p>Rana Elite One (PRO DOS Compatible) 1/2 Hgt (AP) 159.95 Rana Controller 89.95 Rana 10 Meg (IBM) 799.95</p> <p>GARDEN OF EDEN COMPUTERS 16495 Magnolia Westminster, CA 92683 Public N. of the 405 Fwy Mon-Fri 10:30-5:30 Sat 10-5 CLOSED SUNDAYS & TUESDAYS 800-762-3227 OUTSIDE CALIFORNIA ONLY 714-841-4994 800-331-0045 INSIDE CALIFORNIA</p> <p>PRINTERS * BROTHER HR 15 369.95 EPSON FX 80+ 389.95 EPSON FX 100+ 589.95</p> <p>OKIDATA 182P 120 CPS, GRAPHICS, SUPER/SUB UNDERLINE 249.95 92P APPLE OR IBM 369.95 93P COMPATIBLE 589.95 92S IIc/MAC/LISA 449.95 93S IIc/MAC/LISA 669.95 PANASONIC 1091 269.95 PROWRITER 8510 NLQ 319.95 SILVER REED 550P L.Q. 419.95 GEMINI SG 10 NEW !! 249.95 COMPUTER PAPER PAK 4.95</p>	<p>MAXELL SSDD 19.95 MAXELL DSDD 29.95 MIND PROBE 29.95</p> <p>MICROSOFT PREMIUM SOFTCARD 249.95 MULTIPLAN AP DOS 69.95 ALL MAC CHART 79.95 FOUR MULTIPLAN 119.95 PIECES MAC WORD 119.95 399.95 MAC FILE 119.95</p> <p>MANAGING YOUR MONEY 109.95 PEACHTREE BACK TO BASICS APPLE GL, AR, AP 139.95 FILE//e, II+ or IIc 69.95 GRAPH IIc, II+, or IIc 69.95 REPORT IIc, II+, or IIc 69.95 WRITE IIc, or IIc 69.95 IBM VRS. EA 79.95 PRINT SHOP 32.95 GRAPHICS LIBRARY 19.95 PRINT SHOP REFILLS 11.95 PROMETH PRO MODEM 299.95 SARGON III 36.95 SENSIBLE SPELLER IV 69.95 SIDEWAYS (AP/IBM) 44.95</p> <p>SURGE PROTECTORS LEMON 39.95 LIKE 59.95 ORANGE 79.95 PEACH 49.95 KIWI 15.95</p> <p>SKYFOX 34.95 SPEED READER II 44.95 SYSTEM SAVER FAN 64.95</p> <p>Videx ULTRATERM 40-80-96-132-180 COL BUILT-IN SOFTWARE/INVERSE CHIP SUPPORTS II, II+, IIc SPECIAL LOW PRICE 189.95</p> <p>TAKE 1 44.95 TIME TRAX 79.95 THINK TANK (APP) 89.95 THUNDERCLOCK PLUS 109.95</p> <p>Titan TECHNOLOGIES, INC. ACCELERATOR II+, IIc 229.95 ACCELERATOR PC (IBM) 695.95 128K RAMCARD APPLE 199.95 III + II CARD (AP II) 299.95 RUN ALL II+ SOFTWARE ON YOUR III INCL 128K RAM, II+ JOYSTICK PORT & RAMDISK SOFTWARE TYPING TUTOR III 36.95 ULTIMA III 36.95 WORDSTAR W/FREE CP/M CRD 299.95 WORDSTAR 2000 259.95 WORDSTAR 2000+ 299.95</p> <p>BECAUSE HARDWARE AND SOFTWARE PRICES ARE CHANGING SO RAPIDLY, WE URGE YOU TO CALL FOR OUR VERY LOWEST CURRENT PRICES! WE APPRECIATE YOUR BUSINESS and will do everything we can to make you happy. TERMS: F.O.B. Westminster, CA. We accept VISA, Mastercard, Cash, Money Orders, Checks, Certified Checks are better. Purchase Orders (2% 10-Net 15). Add 2% for bank cards & P.O.'s. Ask about our return policy. Prices are subject to change and availability will go down. Subject to stock on hand. Unless otherwise noted, all prices are Apple. Apple is a registered trademark of Apple Computer.</p>
--	---	--

PC, PC JR, DEC, TI PRO SYMPHONY 279.95
HOME ACCT. EXP VER 49.95
KOALA PAD (APPLE) 74.95
KARATEKA 29.95
MAC THE KNIFE I..29.95 II..39.95
MOCKINGBOARD (STEREO) 79.95
MATH BLASTER 39.95

COMPUTER WAREHOUSE

CALL TOLL FREE **1-800-528-1054**

PRINTERS

Anadex
9625B \$1089
WP6000 \$2039
DP6500 \$2179

Brother
DX-15XL \$365
HR-25 \$649
HR-35 \$875

C-Itch
A-10-30 \$469
F-10 Parallel or Serial \$869
55 CPS Serial or Parallel \$1035
8510 Parallel (Prowriter) \$295
8510 SP \$385
8510 SCP \$465
8510 BPI \$315

Citizen
MSP-10 \$329
MSP-15 \$509
MSP-20 \$469
MSP-25 \$639

Comrex
CR-2E \$364
CR-4 Call
420 Call

Datasouth
DS180 \$1089
DS220 \$1315
DS-PP#1 \$449
DS-PP#2 \$635

Diablo
D-25 \$609
D-25 \$1484
630 API \$1669
630 ECS \$1669
630 ECS/IBM \$1669
D-36 Call
80 IF \$2649
P12CQI \$529
P32CQI \$759
S32CQI \$839
P38 \$1639
S38 \$1719
C150 \$999

Epson All Printer Modelist Call

Inforunner
Riteman w/Tractor \$244
Riteman 15 \$499
Riteman Blue w/Tractor \$299

Juki
5500 Call
6100 Call
6300 Call

NEC
2010, 2015, 2030 \$639
2050 \$654
3510, 3515, 3530 \$1215
3550 \$1359
8810, 8815, 8830 \$1665
8850 \$1779
P2, P3 Call

Okidata All Printer Models Call

Panasonic
1091 \$265
1092 \$349
1093 \$519
KXP3151 \$459

Siemens
PT/88 InkJet Call
PT/89 InkJet Call

Star Micronics All Printer Models Call

Silver Reed
EXP400 Parallel \$235
EXP500 Parallel or Serial \$379
EXP550 Parallel or Serial \$399
EXP770 Parallel or Serial \$699

Toshiba P1340 Parallel or Serial \$549
P351 Parallel or Serial \$1165

BOARDS

AST Six Pack Plus \$259
Hercules Color Card \$145
Graphic Card \$295
Paradise Modular Graphic 06-1 \$259
Five Pak \$159

Quadram Quadboard EX Ok \$219
E-Ram 80 \$89
Quadlink \$329

Tec Mar
Graphics Master \$449
126K Dynamic Memory \$225
256K Dynamic Memory \$299
Captain 128K \$299
Captain 256K \$399

102 June 1985 Popular Computing

★ ★ YOUR WYSE CHOICES ★ ★

WYSEpc IBM-COMPATIBLE PERSONAL COMPUTER

Dual Drive
• 256K • MS DOS
• GW Basic

Single Drive - 10 Megabyte
• 256K • MS DOS
• GW Basic

Wy-500 Green Monitor • Wy-600 Color Monitor
• Wyse 50 • Wyse 75

SAVE UP TO 30%

VIDEO TERMINALS

Altos Smart II \$769
Qume
QVT 102 Green \$449
QVT 102 Amber \$469

Televideo
800 \$1225
800A \$979
910 \$425
910+ \$559
921 \$449
922 \$755
924 \$639
925 \$699
925E \$599

Wyse 50 Call
75 \$565
Wyse 85 Call

Zenith Z-22 \$469
Z-29 \$599
Z-49 Call

KEYBOARDS

Keytronics 5151 \$179
5151 Jr. \$179

MODEMS

Anchor Automation
Anchor Express Call
Mark XII \$239

Hayes Smartmodem 300 Baud \$189
Smartmodem 1200 Baud \$379
Smartmodem 1200B (IBM) \$359
Smartmodem 2400 Baud \$219
Micromodem II (Apple) \$219

Novation Smart Cat Plus \$315

Prometheus All Models Call

Racal-Vadic All Models Call

US Robotics Password 1200 \$209

COMPUTERS

NEC
PC-8201 Computer \$315
PC-8201A-90 Battery Pack \$15
PC-8206A 32K Ram \$215
PC-8271A-01 AC Adapter \$16
PC-8271A-02 AC Adapter \$16
PC-8281A Recorder \$89

Sanyo MBC-775 Portable Call
MBC-550 System Call
MBC-555 System Call
MBC-550-2 System Call
MBC-555-2 System Call
MBC-885 Call

Televideo
803 \$1915
804 \$3429
1605D \$1909
1605C \$2299
1605H \$3459
1605CH \$3549
TPC-1 \$795
TPC-2 Single Drive \$1509
TPC-2 Dual Drive \$1749

Wyse
Wyse pc Dual Call
Wyse pc 10 Meg Call

Zenith
Z-150 Single Drive Save 25%
Z-150 Dual Drive Save 25%
Z-150 W/10 Megabyte Save 25%
Z-160 Single Drive Save 25%
Z-160 Dual Drive Save 25%

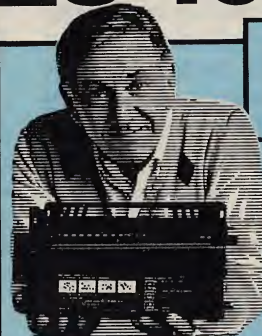
PLOTTERS

Enter Sweet-P600 \$780

Epson Hi-80 Call

DISKETTES

Maxell MD-1 (Qty 100) \$149
MD-2 (Qty 100) \$189



Canon
«PC»
PERSONAL COPIERS



Canon PC-10
Compact. Convenient.
Personal. With the exclusive
Canon cartridge copying
system for easy
maintenance. **\$519**



Canon PC-25
Reduction and enlargement
comes to Personal Cartridge
copying. Make copies up to legal
size from originals
as big as 10" x 14" **\$979**



Canon PC-20
Compact, yet efficient for any
business. With the exclusive
Canon cartridge copying
system. Plus automatic paper
feeding. Make 8
copies a minute. **\$749**

MONITORS

Amdek All Monitors Call
Princeton Graphic HX-12 \$479
Sanyo CRT-36 \$149

Taxan
121 Green \$125
122 Amber \$134
420 RGB \$399
425 RGB/Green \$410

Zenith
ZVM-122 Amber \$95
ZVM-123 Green \$89
ZVM-124 \$129
ZVM-130 Call
ZVM-133 Color/RGB \$410
ZVM-135 Color/RGB W/Audio \$459
ZVM136 \$575

DISK DRIVES

Alpha Omega Turbo 10 \$689
Turbo 20 \$1019
Turbo 30 \$1379

Haba Habadisk for Macintosh \$329

Iomega Bernoulli Box for IBM
10 Megabyte \$1799
20 Megabyte \$2499
20 Megabyte Plus \$2660
5 Megabyte for Macintosh \$1459

Rana Elite I \$179
Elite II \$339
Elite III \$405
Elite 10H/Apple \$1080
Controller (W/Drive Only) \$69
1000 W/DOS for Atari \$175

Tallgrass TG-3020 \$2289
TG-3135 \$3689
TG-4060 \$1469
Controller \$119

Order Processing & Order Line: 1-800-528-1054
Other Information: 602-954-6109

2222 E. Indian School Rd.
Phoenix, Arizona 85016

**COMPUTER
WAREHOUSE**



Store Hours: Mon-Fri 10-5:30 Saturday 9-1
Order Line Hours: Mon-Fri 8:30-5:30 Saturday 9-1



Prices reflect 3% to 5% cash discount. Product shipped in factory cartons with manufacturer's warranty. Please add \$9.00 per order for UPS shipping. Prices & availability subject to change without notice. Send cashier's check or money order...all other checks will delay shipping two weeks.

POPULAR REVIEWS

HARDWARE

Installing the PG Expansion RAM is a snap, even for the technologically squeamish; no special tools are needed, and the whole job takes only minutes. Don't worry about breaking factory seals; the procedure doesn't require opening the Model 100's case—just the expansion compartment on the bottom of the computer. The 15-page manual includes five pages of instructions, plus helpful illustrations, utility program listings, and product specifications.

After installing the expansion RAM, you turn the computer on and follow the instructions for entering and saving the simple (one-line) bank-switching BASIC program, named BANK 0.BA. Once installed, all you do is place the cursor over BANK 0.BA in the Model 100's menu, press Enter, and voilà! The memory banks are switched and the Model 100 displays a new menu screen for the added memory. At any time you can switch back to the original bank and menu by using a similar command.

Batteries Included

The PG unit is shipped powered-up and running with two tiny #389 silver-oxide batteries that power the memory when the unit is out of the Model 100. Three files are stored in the PG unit when you receive it: a document file noting when the batteries were installed, a BASIC program that gives the unit a final test before use, and another BASIC program, similar to the one you enter into the first memory bank, that

switches back to the original memory bank and menu. (Switching the computer's power off and back on again also brings up the original bank and menu.)

When installed, the PG expansion unit draws its power from the Model 100's power supply—without significantly affecting the computer's battery life.

Modular Approach

According to PG's founder and designer, Peter Van Heusden, you can even use several units as interchangeable memory modules. Because the expansion unit has its own battery back-up, you can remove it without losing its memory contents. But the chips are vulnerable to static electricity, damage to the fragile connection pins, and short circuits caused by contact with anything metallic, so the frequent swapping of modules would be less than practical.

You might, however, need to remove the unit to use another peripheral, such as Tandy's Disk and Video Interface. In that case, the batteries should be replaced every six months. With its batteries removed, the PG unit will retain memory for about 30 seconds. In most cases, that's long enough for a safe battery change, but the manufacturer recommends that you back up files on a cassette recorder or other external storage device before changing batteries—a moment's fumble or a defective replacement cell could result in the loss of a lot of data.

While the PG Expansion RAM is, to say the least, a clever and potentially useful addition to your Model 100, there are a few pros and cons to carefully weigh. First, consider compatibility with other Model 100 accessory devices.

When installed, the unit monopolizes the computer's expansion port compartment, so most add-on disk drives and the new ROM-based software chips (which plug into a socket in the same compartment), such as Microsoft's Multiplan, can't be used simultaneously. However, PG plans to offer an optional extension cable that puts the expansion module outside the case, for desktop operation with other peripherals. Clumsy, but workable.

The company also plans to market a newly designed module that will not interfere with the Model 100's ROM socket. According to Van Heusden, the new unit will be functionally identical with the present module.

A Smart Buy?

Then consider the initial cost. The PG Expansion RAM's price of \$250 is nearly half the cost of a new Model 100 equipped with 32K bytes of RAM. But the alternatives are no better: starting at comparable prices and ranging to beyond \$1000 are a variety of expansion RAM devices that only attach outside the Model 100 and significantly increase the size, weight, and often the operational complexity of the system.

Also in its favor, the PG Expansion RAM makes an inexpensive cassette recorder attractive as a mass-storage device. With an extra 32K you probably won't need to save and load files nearly as often. Putting your most frequently used files in the original 32K bank, your secondary files in the PG Expansion RAM, and long-term storage on cassette is an effective way to budget a modest endowment of memory. In fact, the PG Expansion RAM can turn a lot of cute Model 100s into far more useful computers.

—DAN DRASIN

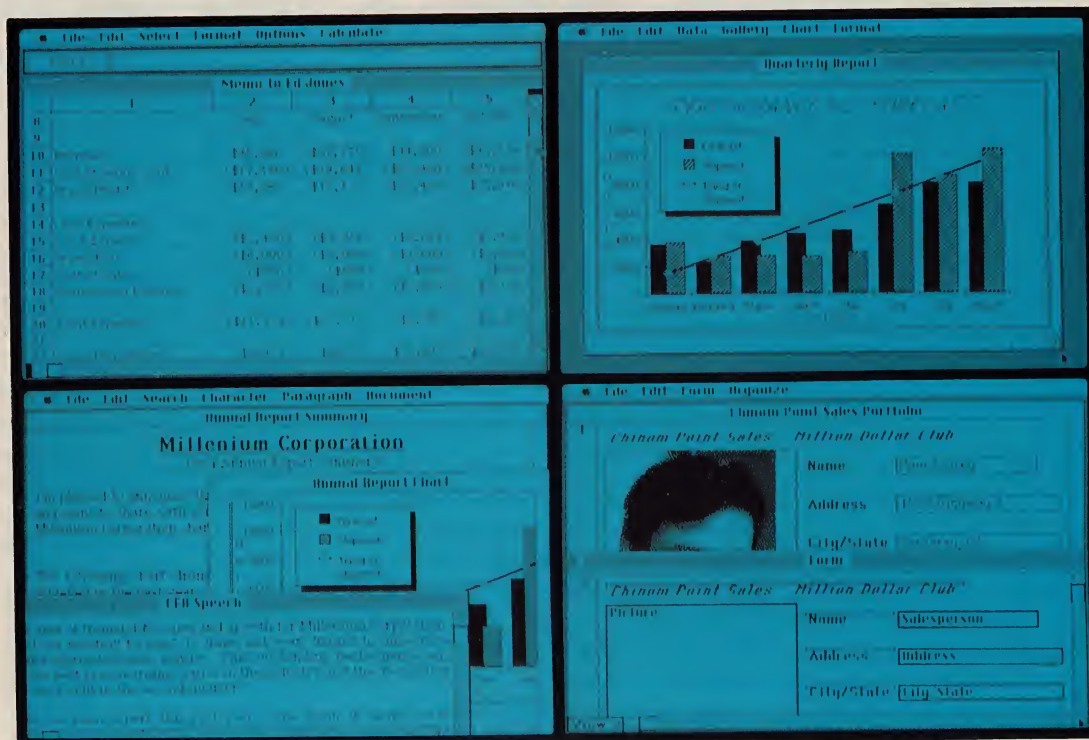
Dan Drasin is an independent writer, media producer, and computer communications consultant who lives and works in the San Francisco Bay Area.

AT A GLANCE

PG Expansion RAM

Manufacturer:	PG Design Electronics, 66040 Gratiot, Richmond, MI, 48062; (313) 727-2744
Standard Features:	32K of CMOS RAM, built-in battery supply (two silver-oxide #389 hearing-aid cells) for maintaining memory outside the computer, bank-switching and RAM testing BASIC programs
Base List Price:	\$250
Options:	Adapter cable for peripherals sharing the Model 100 expansion port (price not available), cassette-based machine-language file-transfer program (\$34.95)
Reviewer's Note:	The 32K-byte PG Expansion RAM effectively doubles the usefulness of the Model 100 while keeping it truly portable. It's well made, uncomplicated, and a breeze to install and use

POPULAR REVIEWS SOFTWARE



CLOCKWISE FROM TOP LEFT: MULTIPLAN, CHART, FILE, WORD.

Business Series for the Macintosh

Microsoft's Multiplan, Chart, Word, and File work alone or in concert to give the Mac new status in corporate America

The Macintosh has received its share of criticism as a business machine, due in large part to a lack of suitable software. But all that's changing. New software, such as Microsoft's Business Series, makes the Mac a reasonable choice for the corporate world.

The series includes Multiplan, Chart, Word, and File, which were designed to be used alone or in concert. Multiplan, Chart, and Word have almost no competition in their respective categories, while File shares space in a crowded market. These programs compare favorably with other Mac software; more important for the time being is that they also hold up well when placed side by side with similar pro-

grams for other computers. I'll evaluate the programs individually and then look at how they work together.

Multiplan

A spreadsheet for nearly all machines, Multiplan runs on a large variety of computers from the Tandy Model 100 to multiuser systems. On the Macintosh, Multiplan remains what it has been on the other systems—a powerful, straightforward electronic spreadsheet. And taking full advantage of the Mac's pull-down menus and mouse, the Mac version is easier to use than the other versions.

Theoretically, Multiplan for the Mac can sup-

Viasyn's inspiration for the CompuPro 816 family.



Durability.

The Army battle tank is probably the epitome of ruggedness and reliability. It has to be. A lot depends on its survival under a variety of extreme conditions.

So it is with Viasyn's CompuPro 816 computer. A multi-user family with dependability that outlasts the competition, regardless of the field conditions. Not to mention superior cost-effectiveness, flexibility, a one- or two-year warranty, and expandability that lets you network up to 255 systems.

You can see the 816 in action at your local Full Service CompuPro® System Center. Call us toll-free for the location nearest you. And talk to trained specialists interested in understanding your needs, and providing the optimum system to satisfy them.

And find out how it can help your business win the war against unproductivity.



VIASYN™

The CompuPro People

Where Computers Grow

3506 Breakwater Court, Hayward, CA 94545
Call 800/VIASYN-1 • In CA, 800/VIASYN-2 • Telex: 510-100-3288 VIASYN CORP
CompuPro is a registered trademark of Viasyn Corporation.

If you've ever scribbled on a yellow pad,
a napkin, a tablecloth, a notebook or a memo
pad,

If you've ever used even the simplest tools
of business to prepare a budget, predict a trend,
plan a schedule or to analyze information of
any kind,

If you deal in straight lines, curved lines,
credit lines or bottom lines,

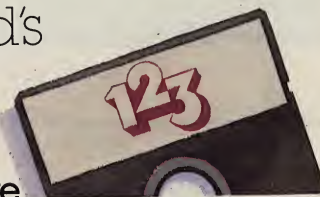
If you've ever asked "what if," "why not," or
"how come?"

If you've ever taken into account a variable,
a sudden change of plans, a mid-course
correction or the weather,

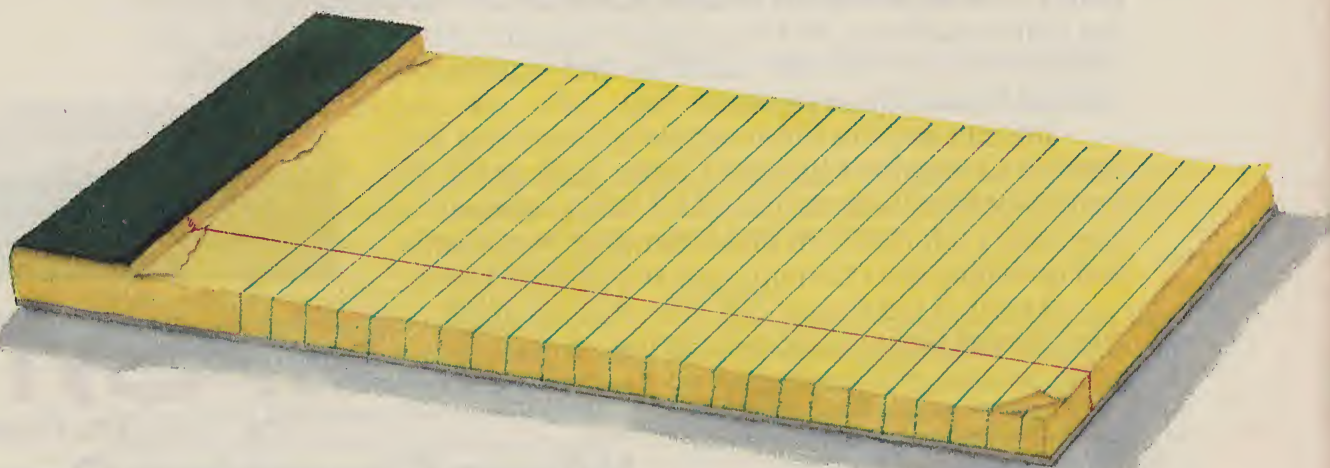
If you work in any kind of business,
anywhere in the world, then you can use 1-2-3[®]
software from Lotus.[®]

That's what makes the world's
most powerful analytical tool
the world's most popular.

More people use it because it does so much more.



Lotus[®]



1-2-3 unites spreadsheet, database and graphics in one fully integrated software package.

Lotus and 1-2-3 are registered trademarks of Lotus Development Corporation.
©1985 Lotus Development Corporation

port a worksheet of 63 columns and 255 rows. Actual worksheet size depends on the data you enter, the size of the fonts you use, and what you store in the scrapbook: on a 512K Mac, you're left with about 20 columns and 255 rows. On a 128K Mac, you have only about 15 columns and 255 rows. Multiplan would be much more useful if it allowed larger models.

The program keeps track of cell locations by both row and column numbers and letters, which, in addition to constituting the cells' names (such as R1 C1), are used in formulas for relating cells and creating new cells.

Lengthy formulas can be a bit confusing, but alternatives simplify the process of defining equations. First, you name a cell or group of cells and then later use that name in a formula. For instance, you can call one row "Sales" and another "Expenses," then use both names in a formula. As well, you can use the mouse to simplify entering formulas. When you click the mouse button while the pointer is on a cell, that cell's position is automatically entered into a formula. The mouse also lets you quickly move long distances within your spreadsheet.

Multiplan on the Mac makes some functions exceptionally easy. You can use the mouse to change the width of a column simply by clicking the mouse button when the pointer is on the border between columns and repositioning the lines. Similarly, you can select a group of cells by holding down the mouse button while moving the mouse as the pointer defines the block on-screen. And you can divide the screen into horizontal or vertical windows, giving you four different views of one model.

Multiplan has a good selection of built-in functions including mathematical, trigonometric, and logical formulas, although some financial functions, such as internal rate of return and present value, are missing.

Other features that will interest serious spreadsheet users are the ability to protect worksheet data so it can't be erased or changed, to iterate formulas to a set value, and

to link together different models. The link function lets you get around the unfortunate limitations in worksheet size. You can create models larger than that allowed by RAM by linking several small worksheets.

All in all, Multiplan is an exceptionally powerful spreadsheet with a wide variety of modeling tools. And it's much easier to use on the Mac than on other machines.

DESIGNED
to easily exchange
data with each other,
Microsoft's four
programs make
optimum use of the
Mac's clipboard
and scrapbook.

Chart

Few programs show off the Mac's graphics capabilities better than Chart, a business graphics package that lets you give visual meaning to numbers and formulas.

Chart organizes your data into groups, each of which it calls a series. Each series contains data grouped according to categories you define. Chart displays each series in its own window and together as a graph or chart in a larger window.

You select the type of graph or chart through the Gallery menu option, which lets you choose among area, bar, column, line, pie, scatter charts, or a combination. You select the type of chart or graph you want by clicking the mouse on its name. You're then treated to samples available within that category.

You can edit charts and graphs, changing sizes, adding legends, and altering titles (including changing the typefaces, styles, and sizes). You can also reposition most of the component parts of a chart or graph to suit your needs. Finally, changes you make in data are immediately re-

flected in the chart or graph.

Chart works well with data from other programs. In addition to entering data directly from the keyboard, you can "paste" in via the clipboard or scrapbook information from Multiplan, MacWrite, and Word. Part of the Mac environment, the clipboard and scrapbook hold text to be cut, copied, or pasted within or between applications. The clipboard contains only the last item cut or copied, while the scrapbook can hold several items.

You can also link information from Multiplan so that changes made in the spreadsheet are automatically reflected in Chart.

Overall, Chart performs admirably and is among the easiest of its type to learn. On the negative side, Microsoft did not give Chart any provisions for color printing. And fine-tuning your charts through the program's editing commands is not as intuitive, or as well explained in the documentation, as the rest of the program.

Still, if you want to create single-color charts and graphs, Chart is perhaps the best microcomputer tool I've seen for that purpose.

Word

Originally scheduled for distribution in April 1984, Word didn't arrive on dealers' shelves until 10 months later. Although the wait was trying, the result was worth it. Word on the Mac is a powerful, full-featured program.

At first glance, Word looks a lot like Apple's MacWrite: it uses the mouse for selecting, moving, and copying blocks of text; pull-down menus for all kinds of functions; and the clipboard and scrapbook for cutting and pasting.

Because Word and MacWrite are basically so much alike, MacWrite scribes will find it easy to learn the rudiments of Word. But Word offers a lot more. For starters, you can view four windows full of information at one time on-screen. You can view different documents or different sections of the same document. And you can cut and paste text between windows as easily as

If you've ever scribbled on a yellow pad,
a napkin, a tablecloth, a notebook or a memo
pad,

If you've ever used even the simplest tools
of business to prepare a budget, predict a trend,
plan a schedule or to analyze information of
any kind,

If you deal in straight lines, curved lines,
credit lines or bottom lines,

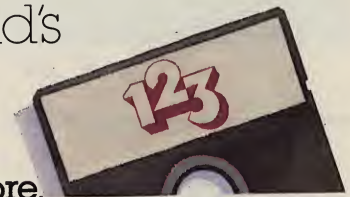
If you've ever asked "what if," "why not," or
"how come?"

If you've ever taken into account a variable,
a sudden change of plans, a mid-course
correction or the weather,

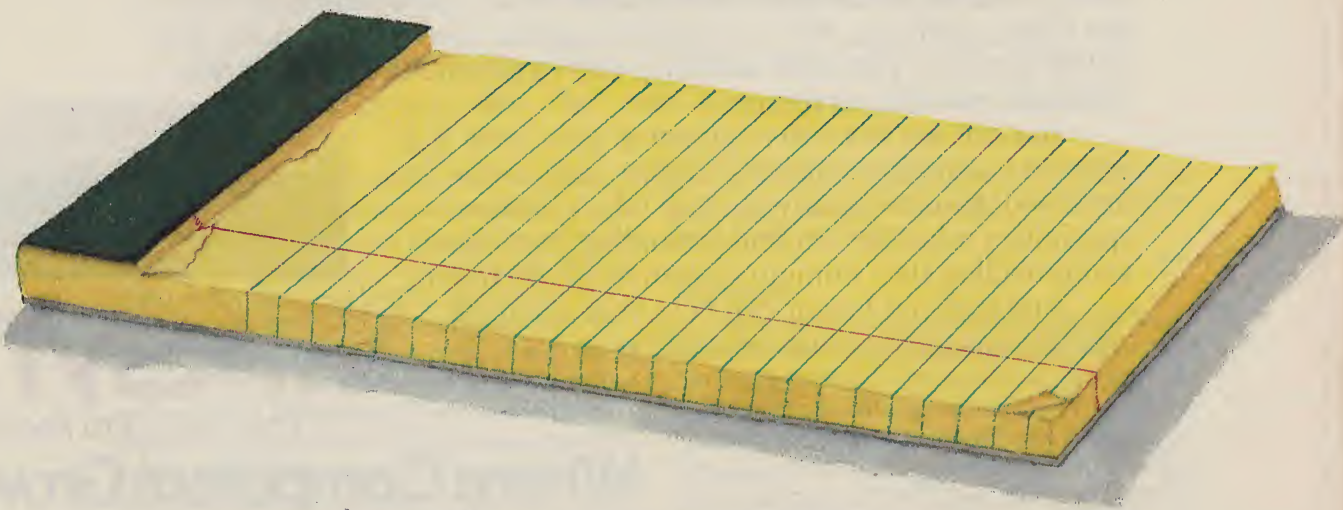
If you work in any kind of business,
anywhere in the world, then you can use 1-2-3®
software from Lotus.®

That's what makes the world's
most powerful analytical tool
the world's most popular.

More people use it because it does so much more.



 **Lotus®**



1-2-3 unites spreadsheet, database and graphics in one fully integrated software package.

Lotus and 1-2-3 are registered trademarks of Lotus Development Corporation.
©1985 Lotus Development Corporation

POPULAR REVIEWS SOFTWARE

port a worksheet of 63 columns and 255 rows. Actual worksheet size depends on the data you enter, the size of the fonts you use, and what you store in the scrapbook: on a 512K Mac, you're left with about 20 columns and 255 rows. On a 128K Mac, you have only about 15 columns and 255 rows. Multiplan would be much more useful if it allowed larger models.

The program keeps track of cell locations by both row and column numbers and letters, which, in addition to constituting the cells' names (such as R1 C1), are used in formulas for relating cells and creating new cells.

Lengthy formulas can be a bit confusing, but alternatives simplify the process of defining equations. First, you name a cell or group of cells and then later use that name in a formula. For instance, you can call one row "Sales" and another "Expenses," then use both names in a formula. As well, you can use the mouse to simplify entering formulas. When you click the mouse button while the pointer is on a cell, that cell's position is automatically entered into a formula. The mouse also lets you quickly move long distances within your spreadsheet.

Multiplan on the Mac makes some functions exceptionally easy. You can use the mouse to change the width of a column simply by clicking the mouse button when the pointer is on the border between columns and repositioning the lines. Similarly, you can select a group of cells by holding down the mouse button while moving the mouse as the pointer defines the block on-screen. And you can divide the screen into horizontal or vertical windows, giving you four different views of one model.

Multiplan has a good selection of built-in functions including mathematical, trigonometric, and logical formulas, although some financial functions, such as internal rate of return and present value, are missing.

Other features that will interest serious spreadsheet users are the ability to protect worksheet data so it can't be erased or changed, to iterate formulas to a set value, and

to link together different models. The link function lets you get around the unfortunate limitations in worksheet size. You can create models larger than that allowed by RAM by linking several small worksheets.

All in all, Multiplan is an exceptionally powerful spreadsheet with a wide variety of modeling tools. And it's much easier to use on the Mac than on other machines.

DESIGNED
to easily exchange
data with each other,
Microsoft's four
programs make
optimum use of the
Mac's clipboard
and scrapbook.

Chart

Few programs show off the Mac's graphics capabilities better than Chart, a business graphics package that lets you give visual meaning to numbers and formulas.

Chart organizes your data into groups, each of which it calls a series. Each series contains data grouped according to categories you define. Chart displays each series in its own window and together as a graph or chart in a larger window.

You select the type of graph or chart through the Gallery menu option, which lets you choose among area, bar, column, line, pie, scatter charts, or a combination. You select the type of chart or graph you want by clicking the mouse on its name. You're then treated to samples available within that category.

You can edit charts and graphs, changing sizes, adding legends, and altering titles (including changing the typefaces, styles, and sizes). You can also reposition most of the component parts of a chart or graph to suit your needs. Finally, changes you make in data are immediately re-

flected in the chart or graph.

Chart works well with data from other programs. In addition to entering data directly from the keyboard, you can "paste" in via the clipboard or scrapbook information from Multiplan, MacWrite, and Word. Part of the Mac environment, the clipboard and scrapbook hold text to be cut, copied, or pasted within or between applications. The clipboard contains only the last item cut or copied, while the scrapbook can hold several items.

You can also link information from Multiplan so that changes made in the spreadsheet are automatically reflected in Chart.

Overall, Chart performs admirably and is among the easiest of its type to learn. On the negative side, Microsoft did not give Chart any provisions for color printing. And fine-tuning your charts through the program's editing commands is not as intuitive, or as well explained in the documentation, as the rest of the program.

Still, if you want to create single-color charts and graphs, Chart is perhaps the best microcomputer tool I've seen for that purpose.

Word

Originally scheduled for distribution in April 1984, Word didn't arrive on dealers' shelves until 10 months later. Although the wait was trying, the result was worth it. Word on the Mac is a powerful, full-featured program.

At first glance, Word looks a lot like Apple's MacWrite: it uses the mouse for selecting, moving, and copying blocks of text; pull-down menus for all kinds of functions; and the clipboard and scrapbook for cutting and pasting.

Because Word and MacWrite are basically so much alike, MacWrite scribes will find it easy to learn the rudiments of Word. But Word offers a lot more. For starters, you can view four windows full of information at one time on-screen. You can view different documents or different sections of the same document. And you can cut and paste text between windows as easily as

POPULAR REVIEWS SOFTWARE

you can within a single window.

Word also includes horizontal scrolling and advanced formatting features (not found in MacWrite). Additionally, Word lets you search for spaces, tabs, and paragraphs and also lets you set search-and-replace functions to match upper- and lower-case selections or to work on whole words only.

Unlike the present version of MacWrite, Word is disk based, which means that document size is not limited by available RAM. (Apple is working on a disk-based MacWrite.) A 400K-byte external floppy disk will hold about a 200-page single-spaced document.

While you can do most anything in Word with the mouse, you aren't tied to it for all functions. Unlike MacWrite, Word gives you a way to move the cursor independent of the mouse. By holding down the control and option keys and pressing the O,K,L, or ",'" key you can move the cursor a character at a time. Other keys let you move a word or page at a time. Hitting the option-command-quote combination expands the scope of the command, letting you move a sentence left or right or to the top or bottom of the document.

Keyboard cursor control is a great idea, but its execution in Word leaves a bit to be desired. Although I did get used to the cursor-diamond arrangement, it would be easier if you could use these keys by holding down the command key alone, instead of both the option and command keys. As it is, it's too easy to accidentally call an uncommon function, such as command-J (repaginate) when you want a more common one, such as option-command-J (move word left).

Microsoft has included other ways of making it easy to select, or highlight, sections of your document, ranging from individual characters to whole sentences and paragraphs.

You also can easily change the margins, tabs, or indents for paragraphs by adjusting a ruler line. You can even have different formats for different paragraphs, and the ruler display changes to reflect the paragraph you're currently typing.

Word lets you undo actions, so that if you accidentally erase text you can replace it. You can also move to a specific page using the Go To command; insert running header lines at either the top or bottom of each printed page; print documents in multiple columns; and change the size, style, and typeface of text.

All Word's features work on either

AT A GLANCE

Multiplan, Chart, Word, File

Manufacturer

Microsoft Corp.
10700 Northup Way
Bellevue, WA 98009
(206) 828-8080

Price and Hardware Requirements

Multiplan, Word, File, \$195 each; Chart,
\$125; 128K or 512K Macintosh

Audience

Macintosh users in the business world

Reviewer's Note

I'd recommend a 512K Mac and external disk drive to get maximum use out of this outstanding series of business programs

a 128K or 512K Macintosh, although the program works faster on the larger machine.

Though Word is good, it still leaves room for improvement, such as a built-in spelling checker, and minor adjustments to the word-processing functions, such as having the program take running heads into account as it determines the position of text on a page.

These complaints are minor, however. Word is a terrific word processor, one that compares admirably with business word-processing programs on other micros. Macintosh has been criticized for not having a professional word processor; this program should rectify that.

File

Unlike the other three programs, File competes with a variety of similar software. And it's well able to hold its own in the crowded field. A file management program with a lot of fancy bells and whistles, File lets you get started quickly but requires practice.

File lets you work with one file at a time. To set up a file, you first define a form, which can have up to 1024 fields. Field types are text, number, date, or picture. That's right—File lets you store pictures in your database. You can copy graphics from the scrapbook or clipboard, including drawings from MacPaint, MacDraw, or Chart. Once your form is designed, you can enter records one at a time by typing information from the keyboard or copy them in from another application.

Form Design

You can move fields around on the on-screen form to change their sizes and relative positions. File comes with two ready-made form designs that you can use as is or as starting points for your own designs.

As you view your records, you can adjust the size of the fields displayed or hide any fields you want. After you've created the form design you like, you can save it, either with the file or separately or both.

Numerous design options give you control over the look of each field. You can set the type font and size for each text, number, and date field. Additionally, File gives you specific formatting choices unique to each field. For example, with a text field, you can choose whether the contents should be left or right justified or centered; and in a date field you can choose from a variety of formats.

Although File, which is disk based, can theoretically hold 65,000 records, the picture fields take up a great and varying amount of space, so it's hard to talk about an average file size. But for comparison purposes and assuming a maximum record size of 375 characters (15 fields of 25 characters each) and no picture field, you could expect to create a file of about 3000 records on a floppy disk. Font size and type style affect record size, too.

After you've created your form and entered records, you can then organize your data as you would with any file management program. You can search your file for specific records, setting criteria for exact matches, or wild card characters and logical operators.

TAKE IT WITH YOU IN STYLE

You can also sort information in your entire file or in a group of records. The program lets you sort the records based on information in up to nine of the fields.

File is well designed and great for simple applications. It allows you a good deal of flexibility, particularly in the way it lets you incorporate graphics in your file.

The Down Side

On the negative side, I ran into a few problems when I attempted to do complex operations. On a 128K Mac, I sometimes ran out of memory. You can get around this problem by saving the file and starting again (as this tends to compact the data), but it can be annoying. And when you've altered the original form design on-screen, the only way to get the original form back is to read it back in from the disk. A simple command to revert the form design to the original state would make life easier.

File isn't the fastest file manager I've seen, and it can't handle complicated database manipulations that require the program to link files. If you need to sort a lot of records quickly, or if you want to create an accounting system or another large database application, you probably wouldn't choose File.

All four programs are copy-protected. Although you can make backups, you still have to use the original disk to boot the program. The copy-protection scheme also lets you install the program on a hard disk. You still need to insert the original before you can run the program, though.

Multiplan, unlike Chart, File, and Word, does not work well from a hard disk. If you start the program from the hard disk, Multiplan will ask to see the original disk and then tell you, impossibly, to insert the hard disk into the floppy-disk drive. Your only choice at that point is to restart the system. To run Multiplan from a hard disk, you must start it from the floppy disk, immediately exit, then start it again from the hard disk.

Each of the programs comes with



Compaq, Columbia, Televideo, Chameleon, Corona V12050 \$79.95

Field-Pro® cases combine rugged protection with the look and style of fine luggage. But beauty is more than skin deep with our exclusive layered design.

First is a Cordura® exterior, then two layers of foam, both shock resistant closed cell and plush urethane. Next to your computer is a silky soft-brushed nylon to protect from abrasion. A handy document pocket on the outside closes with Velcro. You'll appreciate practical extras such as a fully adjustable shoulder strap and padded handles. We thought of it so you wouldn't have to. In fact our cases are guaranteed for the life of your computer. More than twenty (20) models available.

Call (603) 889-6811 for the retailer nearest you.

PO Box 555, Amherst, NH 03031

FieldPro®

STYLES:

APPLE	RETAIL
• Macintosh	\$79.95
• IIC W/2nd Disk	69.95
• IIE (Sale!)	49.95
• Disk II (2 units)	39.95
IBM	
• PC (Key & CPU)	79.95
• Monitor	79.95
• PC Port (spirit PC)	79.95
• Peanut	59.95
OTHERS	
• 80000	79.95
• HP110 NEC 8201	
• 185 80 MOD 100	
• RX 20 Sharp 5000	
• D G ONE	59.95
• Imagewriter	
• Okidata 82, FX, MX80	
• Citoh 8510	49.95

AND MORE!

COLORS — SILVER AND BLACK

FREE SHIPPING!

YOUR APPLE NEEDS WORK FORCE II™

Six Financial & Productivity Programs on one disk

- 1. THE LOAN ANALYZER:** Compute loan and mortgage amortizations, balloon payments, total interest paid, daily percentage rates, present value of capital leases, and periodic payment amounts. Find an unknown term or the amount which can be financed. Print or display amortizations starting or stopping at any period. Currently used by Banks, CPA's and realstate agents across the country.
- 2. THE LINE WRITER™:** A line-at-a-time correctable typewriter. Great for addressing envelopes and other small word processing jobs.
- 3. THE BALANCING ACT™:** Checkbook balancing is made easy with this once a month checkbook balancing program. Menus allow entries to be added or changed. Group totals, amount of error, and all entries can be printed or displayed.
- 4. THE CALCULATOR:** Turns your Apple into a four function printing calculator.
- 5. THE SAVINGS ANALYZER:** Compute the future value of savings, IRA's, and investments in moments with The Savings Analyzer.
- 6. THE WAGE ANALYZER:** Analyze your income by the hour, time & 1/2, weekly, bi-weekly, semi-monthly, monthly and annually. Calculate increases or decreases by amount or percent. Printout provides a great way to present pay raises to employees.

Greg Glau of InCider says: "Borrowing money is no problem with the loan analysis section to guide you. Work Force II is easy to understand and operate. It's an honest value..." June 1984

ONLY \$34.95

Compatible with the Apple IIC, IIE, II+, & II

Call Toll Free

ORDERS ONLY / 24 HOURS

1-800-221-9280

Ext. 979

ALL ORDERS SHIPPED IMMEDIATELY!

DEALER INQUIRIES

Apple is the trademark of Apple Computers Inc.

☐ Please send me WORK FORCE II at \$34.95
☐ check or money order ☐ VISA ☐ MC ☐ AE ☐ COD (add \$4.00 for COD)
 Arizona residents add 6% Sales Tax. Overseas add \$5.00

Card # _____

Signature _____ Valid From _____ to _____

Name _____ Phone _____

Address _____

City/State/Zip _____



Core Concepts
 P.O. Box 24157 Tempe, AZ 85282
 Product Information (602) 968-3756
DEALER INQUIRIES INVITED



NOW AVAILABLE
THE MANUAL:
 A POCKET-SIZE MANUAL IN ALPHABETICAL ORDER
 ONLY \$14.95 EACH

THE MANUAL: IS DESIGNED LIKE A POCKET DICTIONARY. COVERS ALL THE COMMANDS, FUNCTIONS AND FEATURES OF THE PROGRAM.

FOR ALL THE POPULAR PROGRAMS
LOTUS 1-2-3
SYMPHONY
FRAME WORK
dBASE II
MULTIPLAN
WORDSTAR
APPLE WORKS
JAZZ

1-800-MANUALS

☐ VISA ☐ MasterCard ☐ American Express

Please have your card number and expiration date ready when you make your call.

MANAGEMENT INFORMATION SOURCE, INC.
 3543 N.E. Broadway, Portland, Oregon 97232
 Telephone: (503) 287-1462

Lotus 1-2-3 is a trademark of Lotus Development Corp. Symphony and Jazz are trademarks of Lotus Development Corp. Framework is a trademark of Ashton-Tate. dBase II is a trademark of Ashton-Tate. Wordstar is a trademark of Micropro Corp. Apple Works is a trademark of Apple Computer Corp. Multiplan is a trademark of Microsoft Corporation. THE MANUAL is a trademark of Management Information Source, Inc.

a spiral-bound paperback manual, ranging from 172 pages for Multiplan to 283 for Word. Each manual contains a tutorial and a reference section.

Generally these manuals are good. They're well indexed and the tutorials are easy to follow. However, I'd still like to see explanations of common error messages and a single-page command card summary for each program as well as additional detail on some of the more complicated functions of each program.

Working Together

Each of these programs is designed to stand on its own. But the products are even more impressive when you use them in concert because they were designed to easily exchange data with one another: thanks to Microsoft's adherence to the standard Mac interface, all four programs can communicate via the Mac's clipboard and scrapbook. For instance, though Multiplan can't translate your spreadsheet data into a graph at the touch of a button (like Lotus 1-2-3 or Supercalc 3 on the IBM and similar machines), it does make it easy for you to move information from Multiplan into Chart to achieve the same results. And you can link the two programs so that a change in a worksheet will be automatically reflected in its associated chart.

While some will find its limited workspace a problem, most users will deem Multiplan adequate for their needs; as a plus, it's also relatively easy to use. Chart makes it simple to turn out presentation graphics and convincingly shows off the capabilities of the machine. Word does everything you would expect from a word processor and also adds some welcome features such as multiple windows. And File handles simple list management quite well and adds graphics capability.

Many people have wondered if the Macintosh can compete in the business market. Programs such as these may end those doubts.

—MICHAEL J. MILLER

Michael J. Miller is a West Coast editor of *Popular Computing*.

IF POWER FAILS, DATASaver® TAKES OVER!

PROTECTION — saves data during power failures.
 — saves hardware from overvoltage transients.

PORTABILITY — allows mobile or extended holdup time using auxiliary 12 volt battery.

FEATURES — internal battery provides 5 min. + operating time — AC line conditioning
 — audible and visual alarms, interrupt signal — compact, desktop styling
 — no installation required.

Instant power order line
805-541-4161

200 WATT — \$495 / 90 WATT — \$350
 For special applications and product information, call 805-541-4160.

CUESTA SYSTEMS, INC.
 3440 Roberto Court, San Luis Obispo, California 93401

INSTANT AC POWER



What the world really needs is a 99 cent Double Sided, Double Density Diskette with a LIFETIME WARRANTY!

And DISK WORLD! has it.

Introducing Super Star Diskettes: the high quality diskette with the lowest price and the best LIFETIME WARRANTY!

In the course of selling more than a million diskettes every month, we've learned something: higher prices don't necessarily mean higher quality.

In fact, we've found that a good diskette manufacturer simply manufactures a good diskette...no matter what they charge for it. (By way of example, consider that none of the brands that we carry has a return rate of greater than 1/1,000th of 1 percent!)

In other words, when people buy a more expensive diskette, they aren't necessarily buying higher quality.

The extra money might be going toward flashier advertising, snazzier packaging or simply higher profits. But the extra money in a higher price isn't buying better quality.

All of the good manufacturers put out a good diskette. Period.

How to cut diskette prices ...without cutting quality.

Now this discovery posed a dilemma: how to cut the price of diskettes without lowering the quality.

There are about 85 companies claiming to be "diskette" manufacturers.

Trouble is, most of them aren't manufacturers.

Rather they are fabricators or marketers, taking other company's components, possibly doing one or more steps of the processing themselves and pasting their labels on the finished product.

The new Eastman Kodak diskettes, for example, are one of these. So are IBM 5 1/4" diskettes. Same for DYSAN, Polaroid and many, many other familiar diskette brand names. Each of these diskettes is manufactured in whole or in part by another company!

So, we decided to act just like the big guys. That's how we would cut diskette prices...without lowering the quality.

We would go out and find smaller companies to manufacture a diskette to our specifications...specifications which are higher than most...and simply create our own "name brand" diskette.

Name brand diskettes that offered high quality at low prices.



Super Star diskettes are sold in multiples of 50 only. Diskettes are shipped with white Tyvek sleeves, reinforced hubs, user ID labels and write-protect tabs.

Boy, did we get lucky. Our Super Star Diskettes are the same ones you've been using for years...without knowing it.

In our search for the low priced, high quality diskette of our dreams, we found something even more interesting.

We found that there are several manufacturers who don't give a hoot about the consumer market for their diskettes. They don't spend millions of dollars in advertising trying to get you, the computer user, to use their diskettes.

Instead, they concentrate their efforts on turning out the highest quality diskettes they can...because they sell them to the software publishers, computer manufacturers and other folks who (in turn) put their name on them...and sell them for much higher prices to you!

After all, when a software publisher or computer manufacturer or diskette marketer puts their name on a diskette, they want it to work time after time, everytime. (Especially software publishers who have the nasty habit of copy-protecting their originals!)

Super Star Diskettes. You already know how good they are. Now you can buy them...cheap.

Well, that's the story.

Super Star diskettes don't roll off the boat from Pago-Pago or emerge from a basement plant just east of Nowhere.

Super Star diskettes have been around for years...and you've used them for years as copy-protected software originals, unprotected originals. Sometimes, depending on which computer you own, the system master may have been on a Super Star diskette. And maybe more than once, you've bought a box or two or more of Super Star diskettes without knowing it. They just had some "big" company's name on them.

Super Star Diskettes are good. So good that a lot of major software publishers, computer manufacturers and other diskette marketers buy them in the tens or hundreds of thousands.

We buy them in the millions.

And then we sell them to you.

Cheap.

When every little bit counts, it's Super Star Diskettes.

You've used them a hundred times...under different names.

Now, you can buy the real McCoy, the same diskette that major software publishers, computer manufacturers and diskette marketers buy...and call their own.

We simply charge less.

Super Special!

Order 50 Super Star Diskettes and we'll be happy to sell you an Amaray Media-Mate 50 for only \$8.75, shipping included...a lot less than the suggested retail price of \$15.95.



Regular DISK WORLD! price: \$10.95 ea.
+ \$2.00 Shpng.

DISKETTE STORAGE CASES

PERFECTDATA DIAL 'N FILE

Terrific! Holds 10 5 1/4" diskettes. Just flip the lever and they all slide up for easy access and identification. Grey with smoked plastic front.

\$2.75 Ea. + .35 Shpng.

DISK CADDIES

The original flip-up holder for 10 5 1/4" diskettes. Beige or Grey only.

\$1.65 ea. + .20 Shpng.

DISKETTE 70 STORAGE

Dust-free storage for 70 5 1/4" diskettes. Six dividers included. An excellent value.

\$11.95 ea. + \$3.00 Shpng.



HOW TO ORDER:

ORDERS ONLY:

1-800-621-6827

(In Illinois: 1-312-944-2788)

INQUIRIES:

1-312-944-2788

FOR FASTEST SERVICE, USE NO-COST MCI MAIL: Our address is DISK WORLD! It's a FREE MCI MAIL letter. No charge to you. (Situation permitting, we'll ship these orders in 24 hours or less.)

SHIPPING: 5 1/4" & 3 1/2" DISKETTES—Add \$3.00 per each 100 or fewer diskettes. OTHER ITEMS: Add shipping charges as shown in addition to other shipping charges. PAYMENT: VISA, MASTERCARD and Prepaid orders accepted. COD ORDERS: Add additional \$3.00 special handling charge. APO, FPO, AK, HI & PR ORDERS: Include shipping charges as shown and additional 5% of total order amount to cover PAL and insurance. We ship only to United States addresses, except for those listed above. TAXES: Illinois residents, add 8% sales tax.

MINIMUM ORDER: \$35.00 or 20 diskettes.

The Super Star LIFETIME WARRANTY!

Super Star Diskettes are unconditionally warranted against defects in original material and workmanship so long as owned by the original purchaser. Returns are simple: just send the defective diskettes with proof of purchase, postage-paid by you with a short explanation of the problem, and we'll send you the replacements. (Incidentally, coffee stained diskettes and diskettes with staples driven through them don't qualify as "defective".)

WE WILL MEET OR BEAT ANY NATIONALLY
ADVERTISED PRICE
ON THE SAME PRODUCTS AND QUANTITIES
SUBJECT TO THE SAME TERMS AND CONDITIONS.

DISK WORLD!, Inc.

Suite 4806
30 East Huron Street
Chicago, Illinois 60611

DATABASE				
DONE [ok]				
VIEW ORDER		6 Records	NOT SORTED	
ORDER	NAME	DISCOUNT	TERMS	TOT-AFTER-DISC
15	Lexington Auto Service	0.100	NET90	\$1,304.10
18	Hanover Service Station	0.100	NET60	\$1,112.40
20	T Motors	0.020	NET30	\$1,350.44
24	Tosh's Service Center	0.200	NET30	\$1,334.40
29	Concord Bus Line	0.000	NET30	\$1,506.96
30	Roman Olds Dealers	0.050	NET30	\$1,339.50
File: ORDER Previous mode: Initial Files viewed: 1				
Press SPACE to continue				

Cornerstone

This menu-driven relational database gets the job done fast and easily

The terms "powerful" and "easy to use" are pressed into service describing software so often that they're in danger of losing their punch.

Cornerstone, a relational database for the IBM PC, breathes new meaning into those two overworked adjectives and is one of the few programs that deserve both: it rivals the functionality of high-end micro databases and the simplicity of operation of programs on the low end.

Cornerstone is the first professional application program from Infocom, the Cambridge, Massachusetts, firm that has built its fortune on games such as Zork, Enchanter, Deadline, and Starcross.

Designed for business people who have no interest in programming, Cornerstone is completely menu-driven. Yet it's flexible enough to let you do what you want when you want. Once you know how the program operates, you can, in most instances, bypass the menus and enter commands directly.

Straightforward database setup, equally convenient searching and sorting, quick numerical calculating, powerful file-linking capabilities, extensive on-line help and prompting, and plenty of report and on-screen formatting options make this database very attractive. And the speed with which it performs is the icing on the cake.

The package includes a tutorial manual and disk, a two-volume owner's handbook, a copy-protected master program disk (you can run the program from a hard disk without booting from a master), and two sample database disks. The tutorial is generally an excellent introduction to many of Cornerstone's features, but unfortunately gives short shrift to its relational capabilities in the brief explanation of this feature. This is a serious shortcoming because Cornerstone's relational powers are one of its main attractions.

Owner's Handbook I is about all you'll need for general reference. Owner's Handbook II focuses on

utilities for backing up data disks and exporting and importing data to and from other programs such as dBASE II, Lotus 1-2-3, PFS:File, Mailmerge, and the DIF file format. Handbook II also includes data-entry tips and details on recomputing data, reorganizing disk space, and backing up files.

Using the program is easy. You quickly navigate through menu directories, executing operations and building command statements with a minimal number of keystrokes. You'll find that the extensive help menus virtually eliminate the need to refer to the documentation.

The Options feature reminds you of all possible options you have available at any time while you're creating your database and entering or manipulating data.

To expedite things, you can, in most instances, type a command directly from the keyboard without working your way through the menus. If you haven't made a proper command, Cornerstone will let you know and tell you what to do.

Building a Database

To create, revise, or delete files, you choose the Define option from the main menu. From within the define mode, you can create fields and designate or change relationships between fields in different files, thereby exercising Cornerstone's considerable relational capabilities.

Theoretically, you can link an unlimited number of files at any one time by establishing relationships between fields in different files. You don't have to worry about opening and closing files or the number of files that can be open at one time. Cornerstone opens and closes files on its own as needed to execute your commands.

The program can handle up to 120 files per database and 32,700 records per file. Each record can contain 158 fields with 255 characters per field to a maximum of 3800 characters per record. While these numbers aren't on a grand scale, they're certainly enough to cover most applications.

Cornerstone can accommodate all kinds of data types, including char-

acter strings, numbers, dollar amounts, dates, time, and yes/no or true/false entries. Its derived fields allow you to link files as well as perform calculations. Mathematical functions available include log, exponential notation, square root, and absolute value. If you change a derivation, the program automatically recomputes the information throughout the database.

One especially attractive feature is what Cornerstone calls an enumerated field, which lets you specify all that field's possible values. When you go to enter data, you simply select from among those values you've already specified for that field. Enumerated fields have two main advantages: they help assure that only correct data is entered, and data entry is speeded up because to make a selection all you have to do is type the first one or two letters of whatever value you want in there. You can indicate 250 enumerated values for each field. And if you forget the field's values, the options key shows you your choices.

Many other parameters can be specified for field definition. You can set minimum and maximum values, initial values, indexed fields for faster sorts, unique values, mandatory data entry, and even a choice of using dollar signs and commas for numbers. Several date and time formats are available, as are negative numbers in parentheses and scientific notation. Cornerstone provides for subrecords and subfiles for complex database structures.

Quick Customization

Cornerstone makes it easy to add, delete, or change fields, even after you've entered information in the database. Many database programs inexcusably don't have this flexibility. To redefine fields, you simply edit the field parameters in the same manner in which you created them; records in the database are updated accordingly while keeping intact data that you've already entered.

To enter records, select the New-Record command from the main menu and then choose the file in which it belongs. Field names will



INTRODUCING . . .

BRKTHRU™

A BREAKTHROUGH IN ONLINE INFORMATION RETRIEVAL.

It's ready for serious searching whenever you are.

- Day, night and weekend access
- Over 65 databases • Easy-to-use
- Standard and discounted pricing

From one of the world's largest and most powerful electronic libraries comes the daytime/nighttime database service for serious searchers: BRS/BRKTHRU™.

Now you can find what you're looking for fast, in the form of bibliographic citations, abstracts, or full text in many subject areas such as: Business and Finance . . . Science and Medicine . . . Education . . . Social Sciences and Humanities . . . plus General Reference. Best of all, we make it easy: you can learn to use BRKTHRU in minutes.

So let the search begin, with BRKTHRU, the new information retrieval service from BRS. The service for serious searchers.

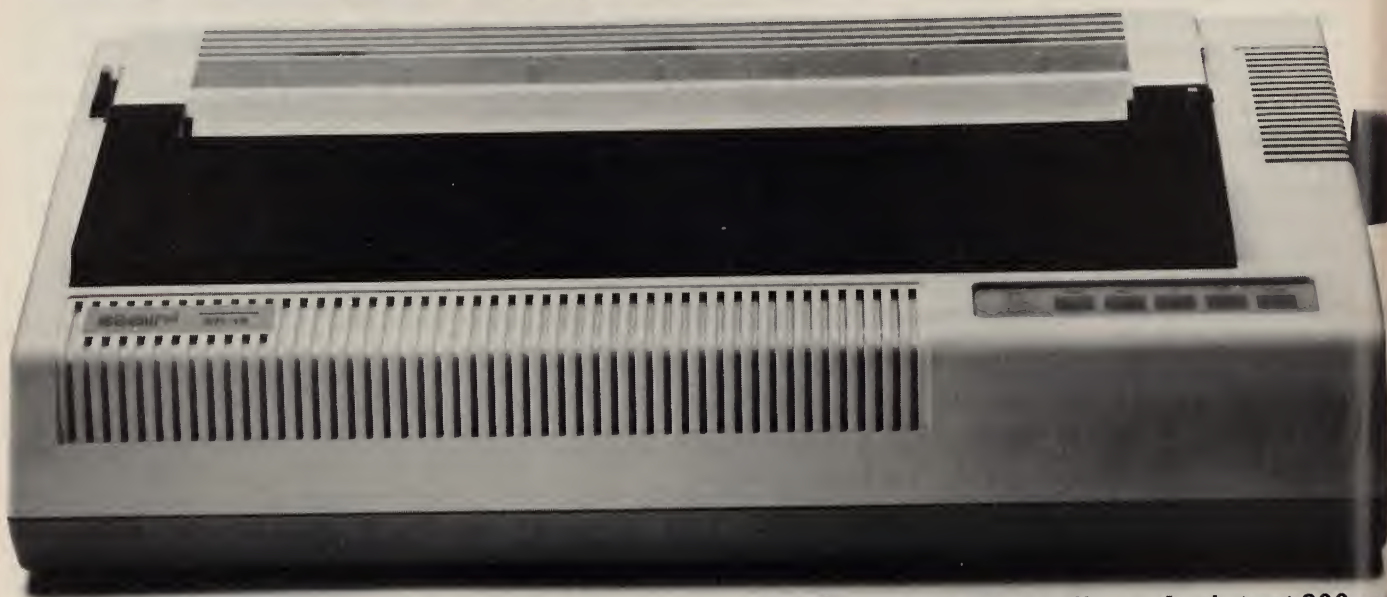
Start by calling toll-free
800-345-4BRS.

BRS
INFORMATION
TECHNOLOGIES
1200 Rt. 7, Latham, NY 12110

™ Trademark of BRS Information Technologies.

Inquiry 16

STAR'S NEW SPREADSHEET PRINTERS: 4 WAYS TO A BETTER BALANCE SHEET.



SR-15™ features a 16K buffer and prints at 200cps

For a better return on your computer investment, consider Star's new "S" series spreadsheet printers.

They're faster—with 20% increased throughput and an unbeatable 16K memory. And better—100% IBM® compatible, with prices that make these printers the best value in the business.

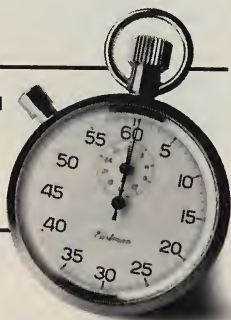
0 TO 15" IN JUST .66 SECONDS

No other printer gives you greater throughput-per-dollar than Star. With the highest-speed NLO in its class. And the best print quality in the business.

All our new business printers feature draft and near-letter-quality standard (no extra charge). So whatever the assignment, these printers come fully qualified.

16K AND NOT A BIT LESS

On all Star's new business machines, the convenience of a 16K buffer is standard. No leading spreadsheet printer has more memory. So hooking up with a Star gives your system the power to process and print at the same time.



EASY AS 1-2-3

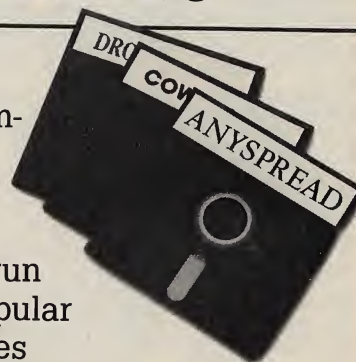
Star's business printers are fully compatible with IBM®-PC, Apple®, and all compatibles.

They're ready to run with hundreds of popular spreadsheet packages including 1-2-3™, General Accounting™, dBase III™ and MultiPlan®. Even integrated formats like Framework™ and Symphony™.

All Star printers are covered by a full one year warranty on parts and labor. Plus a network of factory-trained service centers.

Faster. More memory. More flexibility. More compatibility. Greater reliability. The best print quality. And the best value in the business.

Star's spreadsheet printers give you the best-looking financial statements you've ever seen.



SD-15™ prints draft and NLO

SG-15™ includes 16K memory for spreadsheets

star

THE POWER BEHIND THE PRINTED WORD®

200 Park Avenue, New York, NY 10166
Chicago, IL (312) 773-3717 • Boston, MA (617) 329-8560
Irvine, CA (714) 586-8850

All trademarks (except SG-10/15, SD-10/15, SR-10/15 and Star Micronics Inc.) are proprietary to or registered trademarks of companies other than Star Micronics, Inc.

open

• COMPUTERS • VIDEO • PHOTOGRAPHIC • ELECTRONICS

FOR INFO CALL (212) 725-1234 TOLL FREE (800) 221-3160

IBM PC & COMPAT.

IBM PC w/drive, monitor...1595
 IBM PC w/256k (2) 360 drives, key board, monitor & monitor adapter...1499
 IBM PC As Above w/RGB Color Monitor...2419
 IBM PC XT w/256k...3199
 IBM AT Enhanced...849
 PC JR w/28k...Call
 CANON Athena...Call
 LEADING EDGE PC w/28k (2) 360 disc drives, monitor & adapter, basic DOS 2.11...1499
 LEADING EDGE PC w/256k as above but RGB Color...1995
 LEADING EDGE PC w/256k (1) 360 & (1) 10Mb hard disc, RGB Color, Adapter, DOS 2.11 & Basic...2795
 ZENITH ZF 151 52 w/2 360k Disc Drives, 320k RAM, IBM Compatible, w/Free Microsoft Word & Free Microsoft Multiplan & Color Graphics Ready...2099
 COMPAQ PORTABLE w/256k (2) 360 disc drives, DOS, basic...2199
 COMPAQ PLUS...Call
 COMPAQ Desk Pro...Call

LAP COMPUTERS

HP 110 w/272k RAM, Lotus 123, 80 Col Display, 9.5Lbs...2295
 MORROW w/2 360k, 13Lbs, Disc Drives, 256k, IBM Compatible...Call
 SANYO 550 2...699
 SANYO 555-2...979

apple COMPUTERS

APPLE IIe w/drive...849
 APPLE IIc...899
 APPLE Macintosh...1699
 APPLE IIe Professional System w/ 128k, (2) Duo Disc Drives & 80 Col. Card...1429
 APPLE Image Writer w/Printer & Specify...499

BOARDS FOR IBM

AMDEK MIA...389
 AST 6 Pak Plus...219
 AST mega Plus...269
 AST I/O Plus...139
 Game port adapter...44
 HERCULES color card...179
 HERCULES graphic card for TTL mono monitor...324
 KOLA game controller...44
 PERSYST mono board...174
 PERSYST color...169
 STB GRAPIX Plus II...349
 QUABOARD w/64k...269

PRINTERS & PLOTTERS

EPSON:
 RX 80...234 LQ 1500...1069
 JUKI:
 6100...399 6300...799
 HP: Laser Printer...2795
 HP: Plotter...Call
 Sweet Pea Plotter...Call
 NEC: 3550...1369
 OKIDATA: 82...259
 92...355 84...679
 93...575 2410...339
 OLYMPIA: RO...339
 SILVER REED:
 400...249 500...289
 550...449 770...769
 TOSHIBA:
 1340...598 1351...1239

CANON COPIERS

PC 10...479 PC 20...689
 PC 25...989 Copier Stand...99
 4 Black Cartridges...199

IBM PC

W/64k (1) 360 Disc Drive & Keyboard...1499
 IBM PC w/256k (2) 360 Disc Drives, Graphics Monitor Card, Mon., Keyboard & Software Kit...Call
 IBM PC AT...Call

LEADING EDGE PC

W/128k, Leading Edge Monitor, Keyboard, Monitor & Printer Adapter...1499

ZENITH ZF 151 52

W/2 360k Disc Drives, 320k RAM, Microsoft Word, Multiplan, Keyboard, & 90 Day On Sight Service...2099

1265 Broadway at 32nd St., New York, 10001

50

CORPORATE ACCOUNTS WELCOME
 TELEX NUMBER 42882 SPNUA
 Visa, MasterCard Welcome
 Some Prices Mail Order Only
 We Reserve the Right to Limit Quantities
 Prices Effective June 1, 1985 July 1, 1985

SOFTWARE (IBM)

IBM Topview...Call
 Framework or dBase III...355
 Lotus 123...289 Symphony...419
 Flight Simulator...39
 Word Star...189 WordStar Pro 289
 Word Star 2000...269
 Multimate...249
 Word w/Spell...229
 Turbo Pascal...32
 SideKick...32 Master Type...34
 PC Paintbrush w/Mouse...149
 NORTON utilities 3.0...59
 Copywrite...48 Sideways...59
 Sargon II...39 Zork...258
 R Base 4000...119
 Managing Your Money...119
 Typing Tutor III...34
 Master Type...34 Print Works...59
 Desk Organizer...129
 Electric Desk...199
 HowardSoft Tax Preparer...179
 XY Write II Plus...219
 Quick Code III...149
 Word Perfect 4.0...249
 Peachtree Decision Manager...319
 TKI Solver...249 Think Tank...129

MONITORS

AMDEK 310A...159
 GORILLA Green...89
 LEADING EDGE RGB Color...399
 TTL Green, 139 TTL Amber 149
PRINCETON GRAPHICS:
 HX 12...459 Max 12...149
 SR 12 w/Scan Doubler...899
 SANYO CRT-30...99
 CRT-36...129 CRT-70...549
 TAXAN 410 IBM RGB...349
 TAXAN 420 Hi Res RGB IBM 419
 XTROM 1000 Lines Hi Res Amber
 IBM IBM TTL...149
ZENITH:
 122...89 123...98
 124 IBM Compatible...139
 135 RGB...399
 136 Hi-Res RGB...749

MODEMS

HAYES: 300/209 1200...449
 1200B w/Smartcom II...389
 SMARTCOM II...389
 2400...Call
 Micro Modem II...249
 NOVATION SMARTCAT:
 Internal...348 Extn...348
 US ROBOTICS: Password 1200/349

COMPUTER ACCESS

Disc Bank holds 50...14
 HEAD disc drive cleaner...13
 VERBATIM IBM drive analyzer...29
SURGE PROTECTORS:
 Network cube w/RF filter...29
 Network 4 outlet w/RF filter...59
 Gemini outlet w/RF filter...59

DISKETTES

Verbatim Data Life (10) 21...29
 FUJI (10)...18 24...28
 MAXELL (10)...19 28
 BASF (10)...17 23
 IBM (10)...22 29
FAMOUS MAKE:
 SPECIAL I TDK
 Quantities of 100 ea 1.35 ea 1.55

TYPEWRITERS

CANON Typewriter 5...158
 CANON Typewriter 6...258
 BROTHER CE 58...459
 OLYMPIA Compact II...389
 SMITH CORONA 350M...318
 *After Manufacturer's Rebate

SANYO 550-2

Now Runs Lotus 123!
 IBM PC Compatible,
 360k Disc Drive,
 128k RAM, Word Star,
 Calc Star & Easy Writer
 RGB VIDEO CARD...699

OLYMPIA RO

Daisy Wheel
 Letter Quality,
 14 Cps w/Parallel &
 Serial Ports w/Built In
 Tractor Feed
 3 Pitch ONLY!...339.95

COMPAQ

Portable W/2 360k
 Disc Drives, DOS &
 Basic Keyboard...2199
 COMPAQ
 Plus w/Hard Disc...In Stock

POPULAR REVIEWS SOFTWARE

appear on the screen followed by space for typing your data. You can devise a data-entry format to enter records in any order, any place on-screen. Repositioning fields on-screen is simply a matter of moving them around with the cursor. You can print the customized data-entry screen as forms for hard copy.

Once your database is set up you can examine, change, search, or print information. The simplest way to select the fields and indicate search criteria is to highlight or type the field names desired and add them to the command line by pressing the space bar. The Detailed command presents all field information in horizontal format for easy backward or forward scrolling through records.

Conveniently, Cornerstone lets you peek in unopened files in your database. While looking at an inventory file, you can use the View command to call an unrelated file onto the screen. You can work with eight files at once using the View command. Printing, sorting, report generation, and other features are also at your disposal while you're working with the View Command.

The Update command revises or deletes records according to the current record on the screen, all of the records in a file, or ones that you have marked or "flagged" with the F7 key. Flagging records manually selects records for viewing, updating, or deleting. For instance, you could display a column of names and flag the ones you'd like to see with any or all other fields displayed. Alternatively, you could display all the unflagged records.

Searching

Searching the database for specific records is probably the single most important function you'll perform, and Cornerstone's Select command makes it easy. When you indicate that you want to perform a search, Cornerstone puts on-screen a blank data-entry form. All you have to do is enter the search criteria in the appropriate field. For example, to find all payroll records for people named Jones, you'd type Jones in the Last Name field in the blank entry form

and hit the F9 key to start the search. Following prompts, you can use the usual logical and Boolean operators to define relationships between fields for searching. You can search on any field.

The asterisk serves as a wild card character. For example, "S*" would give you all records with names that begin with "S"

AT A GLANCE

Cornerstone

Manufacturer

Infocom Inc.
 55 Wheeler St.
 Cambridge, MA 02138
 (617) 492-1031

Price and Hardware Requirements

\$495. IBM PC, XT, AT, and compatibles; Tandy 1000, 1200, or 2000 (available from Radio Shack); requires 256K bytes of user memory, 512K recommended

Audience

Small- to medium-sized businesses demanding a full-featured yet easy-to-use database manager

Reviewer's Note

Cornerstone is remarkably easy to learn and use. Yet this welcome quality is not bought at the expense of functions or power

The ellipsis (. . .) lets you search records that span letters, numbers, dates, or times. Cornerstone also understands before, after, and other English requests in data searches.

You can sort on any field in ascending or descending order, alphabetically or numerically.

Reports

Not only can you create customized report forms for data entry and updates, but you also can design customized reports for plain paper as well as preprinted continuous forms. A special menu selection assists in cramming information into tight spots of your preprinted forms.

Cornerstone is a newcomer, but its extensive menu structure, copious and innovative on-line help, and relational powers make it worthy of serious consideration by businesses looking for a simple way to handle almost any kind of information managing task.

—JOEL C. DON

Joel C. Don is a California-based freelance writer.

BUSINESS

LETTER PERFECT(tm) Free: 36158
Frj

3708 Johnson Road
Granite City, Illinois 62040
November 1, 1979

MR. HOWARD CUMMINGS
5811 Flaming Leaf Court
North Chicago, Illinois 60064

Thank you for your recent inquire about product. Yours has been one of many that we have received and the favorable introduction of it to the market is most encouraging.

At the present time we have been handling the orders we have received on a first come basis.

We anticipate that production will meet inventory requirements in about two weeks. We are sorry for this inconvenience, but will make arrangements for you to receive your order in the quickest time possible.

Simply Perfect

A well-integrated word processor, database, and spelling checker for Apples

We should get one item out of the way early: Simply Perfect doesn't entirely live up to its name, but it is indeed very good. It offers owners of Apple IIes and IIs a creditable word processor, a serviceable spelling checker, and a solid database manager for under \$200.

Although simplicity and easy-to-remember commands are desirable, software friendliness doesn't always translate into usefulness. Software power comes from putting as many tools as possible into the hands of the user, and Simply Perfect certainly does that. At first glance, Perfect's extensive command list is intimidating—the command-summary card for the word processor alone lists 62 separate commands. The documentation and tutorials, fortunately, are marvelously clear.

Simply Perfect's two main components, the word processor and database manager, load into the computer's memory when you boot up. This makes for fast execution of

commands and quick transfer between both programs.

The only time you have to insert a program disk is when you want to use the spelling checker. With both programs inside the computer, though, it's no wonder that you need 128K bytes of random-access memory. Only about 40K bytes of that is available for word-processing files (enough for about 25 double-spaced pages of text).

Simply Perfect can run on a single disk drive, but I don't recommend it because separate disks are needed for word-processor files and database files. Jumping back and forth between database and prose on a single drive means constantly swapping disks.

Using Letter Perfect

The word processor, Letter Perfect, has been around for a while. Written in 1979 for the Apple II, its ancestry surfaces in certain archaic key combinations, which do no harm and don't get in the way. For exam-

INCREDIBLE DATABASE VALUE

**Powerful, Flexible, Versatile -
A FULL
DATABASE
at a
Fantastic Price!**



Everyone knows how effective a database can be. But until now, they've either been powerful but hard to use, or just simple personal filing systems.

Now VersaForm has made the database both powerful AND easy to use. Because it's based on your own knowledge of business forms, you can tailor it to your own needs. And because it's a full-featured database, it can do the jobs that lightweights just can't handle.

Proven In Thousands of Offices

For over 3 years, VersaForm has been used by manufacturers, bankers, doctors, farmers, and many others. It's THE program for serious business tasks such as invoicing, to your own needs. And because it's a full-featured database, it can do the jobs that lightweights just can't handle.

VersaForm can:

- Prevent errors by checking entries before accepting them.
- Save time by doing calculations automatically.
- Print on existing pre-printed forms —
- Sort on any item, indexed or not.
- Store up to 4,000 characters in each record, up to 4,000,000 bytes per file.
- Produce the reports you need to manage your business.

30 Day/1 Year Guarantee

- If you're not fully satisfied with VersaForm, return it within 30 days and we'll refund your money.
- Upgrade to our multi-file system, VersaForm XL, within one year, and get Full Credit for the price!

Compare at over

Multi-File

version \$99

(IBM PC Only)

Note: Prices subject to change after 60 days.

\$300. \$69

Credit card members can order by phone.

Toll-Free: 1-800-824-8145

In California, call:

Toll-free: 1-800-854-4448

Applied Software Technology

1350 Dell Ave. Suite #206, Campbell, CA 95008

(408) 370-2662 Dept.

Yes! RUSH me VersaForm

for the IBM PC (\$69) (128K, 2 drives)

* Apple II (+,e,c) (\$69) (64K, 2 drives)

VersaForm XL (MULTI-FILE)

for the IBM PC (\$99) (196K, 2 drives)

Enclose check or money order with coupon.

Include \$4.50 for U.S. postage and handling, \$7.00 for C.O.D. California residents add 6.5% tax. (Allow 3-4 weeks for delivery.)

My check or money order is enclosed.

Charge my: MasterCard Visa C.O.D.

Acct. No.: Expires:

PLEASE PRINT CLEARLY

Name

Address

City State Zip

Phone Sign here

POPULAR REVIEWS SOFTWARE

ple, certain combinations of the Control key and other characters can move the cursor up and down, even though the current Apple IIe and IIc machines have a full complement of cursor keys that are fully operational with the program.

Control-key combinations cause deletions of whole blocks of type, either by word, line, paragraph, or (careful!) file. The "killer" command in this regard is Ctrl-G followed by a B. This dangerous little option wipes out everything *before* the cursor, so if you haven't saved your work on a disk you lose it all.

And speaking of saving files, when you wish to store something on a disk you first call the main menu. Moving the cursor down the list to Save or merely pressing "s" lists the files on the disk. If you are in the middle of an editing session and have been saving all along under a certain file name, that file name appears at the top of the screen; by pressing Return you automatically

save the new material.

Unfortunately, Perfect sometimes discourages the kind of compulsive file saving that's essential to protect your work. Here is what happens. The program has a copy buffer, a handy electronic storage area for frequently used words or phrases that you can insert into the text by simply pressing Esc-G. To save work onto a disk, however, the copy buffer must be empty. This means that every time you save, you must erase the buffer. This is an unfortunate glitch, but not a fatal one.

Letter Perfect's search-and-replace feature locates items in the text and replaces them with other words or groups of words. Say you're writing a term paper comparing the philosophies of Nietzsche, Schopenhauer, and Feuerbach. You need merely use the letters N, S, and F in your draft; on the final version you can go through with search and replace to spell all those finger-numbing names automatically. As

useful as this feature is, it isn't quite... perfect: it won't let you search for anything that includes a carriage return.

Also, I must warn you that responses to commands get much slower on files longer than 20K bytes. A simple character deletion in a long file can take nearly a full second.

As well, the program "charges" memory space for a full line, even though you use only part of it. For example, a comma typed on an 80-column line takes up as much memory (80 bytes) as a full line of prose. Perfect does let you adjust the width of your screen display, so if you prefer composing your prose on 40- or 50-character lines instead of the usual 80, you can. With a 50-column display, the program charges only 50 bytes per line.

You can insert headers and footers in your documents. Underlining, boldface, automatic page-numbering, centered lines, subscripts and

FULL LINE DISCOUNT COMPUTER SUPPLIES

COMMERCIAL & INDUSTRIAL ACCOUNTS WELCOME

5 1/4" DISKS

	SS/DD	DS/DD
Datalife 12-paks (While supplies last)	\$18.95	\$22.95
Tech-Comm*	\$14.95	\$17.95
Maxell	\$18.95	\$22.95
Fuji	\$17.95	\$21.95

5 1/4" HIGH DENSITY/IBM AT

Tech-Comm*	\$44.95
Datalife	\$47.95
Maxell	\$47.95
Fuji	\$47.95

3 1/2" DISKS

Tech-Comm*	\$34.95	\$45.95
Datalife	\$37.95	
Maxell	\$37.95	\$49.95
Fuji	\$37.95	

MEDIA STORAGE

	5 1/4"	3 1/2"
Disk Bank 50/30	\$10.95	\$10.95
Flip 'N' File 50/25	\$13.95	\$8.95
Flip 'N' File 10/10	\$ 3.95	\$3.95

Amdek 300A Monitor	\$ 149.95
20 Okimate/Full Color Printer	\$ 159.95
Toshiba P1340 Printer P/S	\$ 695.95
P1351 Printer P/S	\$1,295.00
Panasonic 1093 Printer/PLL	\$ 709.95
Lemon Surge Protector	\$ 37.95

*ALL TECH-COMM DISKS 2 FOR 1 GUARANTEE

CALL ABOUT:

- DRIVE ANALYZERS
- HEAD CLEANING KITS
- DATA CARTRIDGES
- MEDIA STORAGE
- RIBBONS/PRINTWHEELS
- DUST COVERS
- COPY HOLDERS
- PAPER/LABELS
- TOUCH MATS
- EDP SURGE PROTECTORS
- CABLES
- MODEMS
- TOSHIBA & PANASONIC PRINTERS
- PRINTER STANDS
- MODEMS
- AMDEK MONITORS

24 HR. SHIPPING ON ALL ITEMS IN STOCK

SHIPPING & HANDLING:
ALL CHARGES AT OUR COST
TAXES: 5.5% OHIO ONLY
PAYMENT: VISA/MASTERCARD/
M.O. C.O.D. \$3.00 ADDITIONAL



NATIONWIDE 1-800-522-7770

OHIO 1-513-522-7710



BRENCOM
COMPUTER SUPPLIES

948 BUTTERFLY COURT • CINCINNATI, OH 45231

BLANK DISKS

Major Brands • Low Prices

Call ALF first
1-800-321-4668

If you need 50 or more top quality disks, bulk-packed (without expensive labels or fancy packaging), call the toll-free number above for the latest price on your favorite brand. ALF copies thousands of disks each day—so we know which disks will perform best with your system! Inside Colorado call 234-0871.

ALF

ALF Products • Denver, CO

superscripts are all provided.

People looking for on-screen help will be disappointed because there is none. You can get a list of commands off the main program disk, but you can't call it to the screen while working on another file; you can use only one file at a time. For help, you must read the manual or the command-summary card.

Spell It Right!

At any time during your writing, you can use Spell Perfect by loading the dictionary disk. (No, you can't check spelling in the database portion; the checker works only with the word processor.) When you select the verify option from the menu, the program does a quick word count of the file you're checking. Also counted are the number of different words and the number of words not in the dictionary.

When the counting stops, the checker automatically runs through the file, pausing and highlighting all words it can't find in the dictionary disk. For each of these words, you can ignore the apparent discrepancy, ask the checker for a list of similar words, or change the spelling, either manually or by choosing one of the words from the list.

I was astounded at some of the words that the checker didn't recognize, including both "cursor" and "diskette." Otherwise, this feature is useful. By the way, you can add words to the dictionary—I'm teaching mine computer jargon.

Database

Data Perfect has enough power to satisfy most users. It hasn't the punch of some of its costlier cousins, but it will serve the small-business person well.

To create a database, you must first define a form, called a record, in which you enter your data. Within that record are spaces for each piece of information, called fields.

The program guides you through the process of creating your database, offering a menu of possible commands to invoke at each step. It tells you how many records will fit into the database, depending on the

space you set aside for each record.

With Data Perfect and most other database programs for the Apple, you must specify initially the maximum number of characters per field. Data Perfect allows up to 127 and up to 511 characters for the entire record; you may have, at most, 32 fields in a single record. These numbers compare reasonably well with other

AT A GLANCE

Simply Perfect

Manufacturer

LJK Enterprises
7852 Big Bend Blvd.
St. Louis, MO 63119
(314) 962-1855

Price and Hardware Requirements

\$189.95; Apple IIe and IIc with 128K bytes of user memory

Audience

Small businesses

Reviewer's Note

A good package for small-business applications, with a variety of easy-to-use features

Apple database managers.

I give Data Perfect high marks for flexibility but must complain about the number of disks it requires. Each new database goes on its own disk. Furthermore, the program asks (sensibly, I'll admit) that you make a backup disk for each database—your cache of blank disks disappears quickly.

The database commands can't be described as intuitive, and some seem downright illogical. For example, Quit tells the program that you are ready to execute a command. Edit doesn't always mean that you are about to change something; it might mean that you want to search the database for specific entries. If you try to wing it, you will become discouraged. But if you keep the well-indexed manual nearby, and take time to go through the program's tutorial, you will be pleased at what you can do.

You can import data from another database or any text file with a regular, repetitive structure—such as a collection of four-line entries of your friends' names, addresses, and

phone numbers. Or you can add fields to an existing database—your friends' birthdays, for example. You can set things up so that default values automatically appear.

Integration

So far, I've treated Perfect's word processor and database manager as separate programs, but they do work well together. As a test, I used both on a couple of projects. One involved sending 20 letters to the parents of children who had long-overdue books from the school library.

First, I created a database of the students' names and classrooms, the titles and authors of the overdue books, and replacement costs to the parents if the books were not returned. Next, I wrote a letter with space for the database information. Then I ran the two files together and printed the results. It worked on the first try—20 personalized letters without a hitch.

The next project was to create a PTA financial report by making a database and then using the report-generating option to print out a listing. Another success.

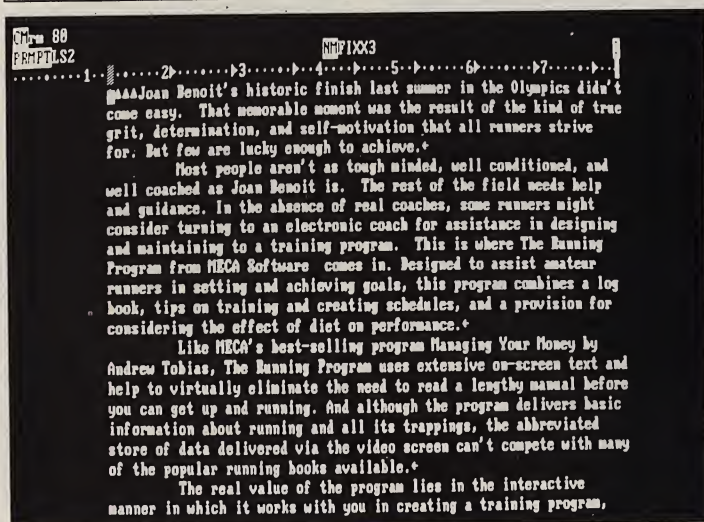
The final challenge I threw at Simply Perfect was the word processing for this review, and I was a little disappointed by the sluggishness of the editing functions with longer file lengths. At the end of the file, where all the new writing gets done, everything seemed fine. However, when I went back toward the beginning to edit and tidy things up, essential functions like deleting and inserting slowed down considerably. If you often write articles more than five or six pages long, you'll want to think twice about Simply Perfect as your word processor.

I remain impressed by the way Perfect's applications work together. For word processing and databases not requiring high speed and huge storage capacities, you'll have trouble finding a better program—especially one with a manual as close to perfection as this one.

—JOSEPH J. ELIA JR.

Joseph J. Elia Jr., a frequent contributor to *Popular Computing*, is manager of editorial operations at *The New England Journal of Medicine*.

WORD PROCESSING



Xywrite II Plus

*Modeled on the Atex System,
this command-driven program is fast*

Supported by about 10,000 often fanatically loyal users, a dark horse contender in the IBM PC word-processor grand prix has recently emerged from the shadows.

Xywrite II Plus is fast, loaded with features, and in a world of menu-driven programs, decidedly against the grain with its strictly command-driven format.

The most immediately noticeable of its many features is its speed. Not only does Xywrite save and retrieve large files in seconds and perform instantaneous delete, block-move, and search-and-replace operations, but this program also resides in a compact 80K bytes of RAM along with the entire working file—up to the limits of your computer's RAM—for impressively quick long jumps of the cursor across large documents as well as fast, smooth paging and scrolling.

In addition it offers a very generous array of advanced editing and formatting features. For example, you can use DOS commands or run other programs from within Xywrite

without abandoning your place in the document. Xywrite also includes facilities that allow you to perform arithmetic functions and fill in forms on-screen or merge text into form letters.

But mastering this fully featured program requires practice. Xywrite has, if you will, a standard transmission. The people at Xyquest elected to use a command-driven design after deciding that a menu-prompted structure would obstruct efficient use of the program. Entirely command driven, Xywrite requires that you learn how to give it directions. Some computer users may be overwhelmed by the number of editing and formatting functions you have to learn during the break-in period. But once you get beyond that, Xywrite feels as logical and comfortable to handle as a Porsche gear box.

Xywrite's command structure actually involves only three kinds of procedures for executing any editing or formatting command: press a function key alone or in combination with Alt, Shift, or Ctrl; press the

Ctrl key and a number key; or press F5 to get to the Command Line (CM) at the top of the screen and then enter command words. Once you've reduced Xywrite's commands to those three types of maneuvers—a useful conceptualization that the manual never states in so many words—the program's organization becomes clear.

To check further confusion, four help screens serve as handy reminders of command-line codes. Additionally, you can turn to the well-indexed, but tedious 200-page manual for help. An introductory tutorial will get you started.

Xywrite borrows three lines of the screen; the remaining 22 are free for text. The top line (CM) is reserved for entering commands; the second line (PRMPT) informs you when a command has been executed, displays the name of the file you're working on, and lets you know when you've engaged the Caps, Num, or Scroll lock keys; and the third line, which you can remove from the screen, displays all 25 function-key commands.

Xywrite's windowing capability lets you split its screen horizontally and vertically as well as toggle between two full screens of text open at one time. In all three splits, you can easily switch back and forth between two open documents and move text between them.

Nuts and Bolts

These fancy features are all well and good, but what about the nuts and bolts of entering and editing text? Well, this is where Xywrite really shines. Inspired by the Atex system used widely in the publishing industry, Xywrite can keep up with the fastest typists. And when you insert new words in existing text, paragraphs readjust instantly—likewise when you make deletions.

Xywrite offers enough ways to remove unwanted words from text to please even the most demanding writer. A character, a word, the rest of the line (from the cursor to the end), or the entire line can be erased with one or two keystrokes. Xywrite also handles sentence, paragraph,

block, and column deletions and moves just as easily, and you can restore any section of text you just erased.

The final test of a word processor's editing elegance is how it handles the search-and-replace function. Xywrite searches either forward or backward, pays attention to or ignores uppercase and lowercase distinctions, and uses wildcards for letters, numbers, or strings up to 80 characters long.

Xywrite executes global search-and-replace commands very quickly. And like most word processors, it offers the option of letting you verify each change before it is made.

Printing and Formatting

Xywrite provides a what-you-see-is-what-you-get system on its standard editing screen including on-screen underlining, margin changes, and boldfacing. Among the few exceptions are page breaks and numbers, footnotes, variations in line

AT A GLANCE

Xywrite II Plus

Manufacturer
Xyquest Inc.
POB 372
Bedford, MA 01730
(617) 275-4439

Price and Hardware Requirements
\$295; IBM PC, XT, AT, jr., and compatibles.
\$350; DEC Rainbow. \$325; TI Professional
and Data General One. 192K bytes of user
memory recommended

Audience
Serious and frequent writers

Reviewer's Note
The time invested in learning this powerful
word processor is well worth the effort

spacing, and running headers and footers—a relatively typical set of exceptions to on-screen formatting.

Xywrite's review mode gives you an exact picture of how your document will appear in print, including headers and footers, footnotes, and page numbers. Automatic footnot-

ing, not a common word-processor feature, is handled as easily as headers and footers are. Footnotes are automatically numbered and can be printed at the bottom of pages or together at the end of the document.

Xywrite can automatically generate indexes and tables of contents. One notable indexing limitation is that Xywrite cannot group all the occurrences of an indexed item into one index entry. You must do that manually after you generate the index list.

Xywrite's standard ASCII files can be read by most MS-DOS programs, including spelling checkers.

Customizing Xywrite

If anything about Xywrite offends your functional or aesthetic sensibilities, there is likely to be a way to change it. Few programs can be so completely custom-tailored. I can color my Princeton Graphics System monitor in a different foreground and background combination any-

NOW, IN VIBRANT COLOR!

**LARGER-THAN-SCREEN GRAPHICS
OVER 120 TYPEFACES AVAILABLE
DOZENS OF SUPPORTED PRINTERS**

FONTRIX™ \$155, FOR THE IBM-PC,
VERSION 2.5 XT, AT, PCjr & 100%
COMPATIBLES - REQUIRES
256K, MS-DOS 2.0 OR
LATER AND A COLOR
GRAPHICS CARD.

FONTRIX™ \$95, FOR THE APPLE
VERSION 1.5 II FAMILY - REQUIRES
48K AND DOS 3.3.
FONTPAKS™ \$25 EACH - 10 FONTS
VOLUMES PER VOLUME - APPLE
1 - II AND IBM.

THIS AD WAS DRAWN, TYPESET, AND PRINTED USING

FONTRIX

GRAPHICS & TYPESETTING SOFTWARE

FROM

DATA TRANSFORMS

616 WASHINGTON ST
DENVER, CO 80203
(303) 832-1501

TRADEMARKS: FONTRIX & FONTPAK - DATA TRANSFORMS, INC. APPLE II - APPLE COMPUTER, INC. IBM-PC, XT, AT & PCjr - INTERNATIONAL BUSINESS MACHINES CORP.

ACT NOW!
\$9.95 VALUE

FREE OPUS DISKETTE HEAD CLEANER

With Purchase of OPUS "Unfloppable" Floppies

OPUS has a money saving offer to get you to try our floppies, the most reliable on the market today. Purchase 20 OPUS 5-1/4" diskettes and you can receive a Free UNIVERSAL HEAD CLEANER (\$9.95 value), for use on single or dual-side drives.

Purchase OPUS diskettes at your local computer store, send two box tops, a dated sales receipt, and coupon and we will send your Free Head Cleaner.

Or — order by mail and receive Head Cleaner with your shipment.
Or — Call, Toll Free:
1-800-692-6905, Dept. "M,"
to charge on your VISA or
MasterCard.

Now you have a
money saving reason
to try OPUS diskettes.
You will have "NO
BAD MEMORIES!"



Inquiry 67

OPUS
NO BAD MEMORIES

SEND TO: OPUS Computer Products
'85 HEAD CLEANER OFFER
Dept. PC 685, 150 Chicago Street
Cary, IL 60013

Name _____

Address _____

City _____ State _____ Zip _____

Phone () _____

☐ Proof of Purchase Enclosed OR SHIP ME _____ Boxes of OPUS 5-1/4" Diskettes:

CHECK ONE: ☐ \$19.95 Single-Side 10-pack ☐ \$29.95 Dual-Side 10-pack

Add \$1.50 for shipping & handling (Illinois residents add 6% sales tax.)

TOTAL ENCLOSED: \$ _____ (Check or Money Order Only)

Charge to my: ☐ VISA ☐ MasterCard

Account Number: _____

Expiration Date: _____

Signature: _____

OFFER EXPIRES AUGUST 31, 1985.

time or change the program's default parameters in less than a minute. Xywrite comes with its own built-in "keychanger" for redefining the function of any key on the PC board. You can, for example, change A to Z or bring the awkwardly positioned lefthand shift key within easy reach.

You can also set up keyboard macros that insert frequently used boilerplate text into your letters and reports whenever you press Alt and a preselected letter or number key.

For automating even more complex procedures, you can use the New Program command to record any sequence of keystrokes into a file. The more technically inclined user can take advantage of the Extended Programming Language to create programs of keystrokes that contain things like logical operators and conditional key sequences.

Just Around the Corner

Xywrite III should be available by the time you read this, according to Xyquest, with a price tag of about \$400. Xywrite III will add proportional spacing to the program's current microjustifying ability (with printers that can handle this feature). It will also include multi-column text editing, style sheets, and hyphenation by algorithm. None of the basic features of II Plus will be changed, however, in the transformation to III. (Xywrite I, which is basically a screen editor, is still available for \$50. Xywrite II can be purchased for \$195. And Xyquest will still sell II Plus for \$295 after the introduction of III.)

It's been suggested by several software critics that the criterion for a program's friendliness is not if you can master it in an hour, but if it saves you time and keystrokes in everyday use over the long haul. Xywrite fits that definition very well. The probability of a professional or business user outgrowing Xywrite is very, very small. Serious writers will find it especially congenial. Xywrite takes some work to learn but it's worth it in the end.

—CHARLES SPEZZANO

Charles Spezzano writes about topics in psychology and personal computing.

GRAPHICS



Digital Paintbrush

This well-stocked toolbox is suitable for professional and personal use

Ever since MacPaint brought electronic artistry to the people, software companies have been trying their best to cash in on the graphics craze. Some programs unabashedly copy Apple's big hit. Others, like Digital Paintbrush, in addition to offering a full array of graphics tools, try to make the drawing process easier by providing an input device that closely resembles a conventional art tool.

Digital Paintbrush is a multipurpose drawing and graphics program, suitable for personal and business applications, that uses a drawing pen attached to a special digitizing unit as an input device. Not to be confused with a touch-sensitive digitizing drawing pad, Digital Paintbrush's input device lets you draw or trace on any surface while it records your movements on-screen.

Distinguishing itself from other graphics programs, Digital Paintbrush has telecommunications capabilities for working interactively on-

line with someone who's also using the program. As well, its ability to import designs, graphs, and charts created with other programs gives it versatility and makes it a good graphics editor.

With Digital Paintbrush, you can draw lines, boxes, circles, and curves with any of 38 brush tips; add text in 15 typefaces; use images from an extensive on-disk library; alter their sizes and colors; and reposition and reproduce them quickly and effortlessly. You can store, retrieve, and modify designs; assemble images and display them automatically and continuously on-screen; or print copies in various sizes.

Digital Paintbrush comes with its own input device, a 2- by 8- by 11-inch plastic digitizing unit to which is attached a pen. The pen's tip is tethered to two Dacron lines that connect to potentiometers inside the unit. You connect this unit to the computer's game I/O port and position the unit in front of the com-

puter. As you move the pen around the drawing area, which is the space between you and the input device, the Dacron lines extend and retract. When you depress the pen tip, the potentiometer values are converted to screen coordinates and the appropriate pixels are illuminated. (You can also use the program with a joystick, touch tablet, or other input device.)

Square One

After installing Digital Paintbrush and performing a simple calibration procedure, you specify one of four drawing-area sizes, from 10.5 by 7.75 to 5 by 3.75 inches. You then return to the main menu and select either the Graphic Design Program, Text Screen Editor, Presentation Program, or Printout Program.

The Graphic Design menu contains the following options and tools: Brush, Edit, Disk, Draw, Box, Circle, Curves, Fill, Alpha, Micro, Grids, and Clear.

Brush takes you to a submenu where you can select both the color and width of lines. Mixing colors, however, brings you face to face with a hardware limitation that prevents displaying true solid colors. To get red (which is not one of the eight Apple colors) I mixed violet and orange and ended up with a peppermint-striped pink. The colors didn't really blend; rather, the juxtaposition of alternating violet and orange lines produced the reddish effect.

By the time you read this, Computer Colorworks should have released a version of the program designed to take advantage of the extra color capabilities of the Apple IIe and IIc. This will give you 16 solid colors as well as the ability to mix them in various ways to create different patterns. Current Digital Paintbrush owners will be able to upgrade for a nominal fee.

(Also available is an IBM PC version. Priced at \$450, it has features not found in either of the Apple versions. These include three-dimensional and statistics capabilities and chart and graph generation.)

Selecting Edit lets you cut and paste portions of any design. Once

Sailing on the changing tides of business, there is no room for uninformed decisions.

You don't go sailing without the right navigational instruments.

And you don't make business decisions without the right information.

With Dow Jones Straight Talk™ and your Macintosh™ personal computer, you have the right information to make seaworthy business decisions.

Widgets, Inc.: To Acquire or Not?

Let's say you need to know everything you can about Widgets, Inc. and the entire miniwidgets industry. You're thinking about an acquisition. You need solid research.

And you need it for the important meeting at 4 p.m.

Dow Jones Straight Talk: Helping You Make Informed Decisions

Straight Talk can help. Straight Talk could even make you a hero. Here's how: Two clicks of the mouse and you're logged on to the information you need with Dow Jones News/Retrieval®, the foremost electronic resource for business and financial information, and other communications services.

With pull-down menus, you can move easily between databases, checking current news and stock quotes, reviewing exclusive stories from the up-to-date file of **The Wall Street Journal**, searching out financial information on a specific corporation or industry.

Now use your Clipboard, Note Pad and Scrapbook to save it.

Since Straight Talk supports MacWrite™, you can thread all this data together with your own informed comments.

Now the final report: Use the different type sizes and styles to highlight special sections for your boss. Your conclusion: Don't acquire the company. It's on thin ice.

With Straight Talk, hours worth of research can be condensed into just minutes.

And, as the meeting ends, you can barely hold back that big grin.

From now on your career should be smooth sailing.

A World of Information on Your Desk

At \$79, Dow Jones Straight Talk is the least expensive, most diligent researcher and electronic know-it-all you'll ever come across.



Dow Jones Software. For informed decisions.

Dow Jones News, Retrieval is a registered trademark of Dow Jones & Company, Inc. Dow Jones Software and Dow Jones Straight Talk are trademarks of Dow Jones & Company, Inc. Macintosh is a trademark licensed to Apple Computer, Inc. MacWrite is a trademark of Apple Computer, Inc.

Copyright © 1985 Dow Jones & Company, Inc. All Rights Reserved.

In addition to business and financial information, you can click into world and national news, sports, weather, an encyclopedia, airline schedules and fares, movie reviews and MCI mail.

And Straight Talk is from Dow Jones, publisher of **Barron's** and **The Wall Street Journal**, and for over 100 years a standard in timely, reliable information.

Dow Jones Straight Talk for the Macintosh. A precision instrument designed to make sure your ship comes in.

To obtain a free brochure and information on where you can conveniently purchase Dow Jones Straight Talk, fill out the coupon or call:

1-800-345-8500 ext. 272

(Alaska, Hawaii and foreign call 1-215-789-7008 ext. 272)

Inquiry 32

Fill out this coupon and mail to:
A. Callahan, Dow Jones & Company,
P.O. Box 300, Princeton, N.J. 08540.

Yes, please send me a free brochure on
Dow Jones Straight Talk™ and
Dow Jones News/Retrieval®

Name _____

Company _____

Address _____

City _____ State _____

Zip _____ Phone _____

Dow Jones™
Software

CGF



"I think we turn left here."

POPULAR REVIEWS SOFTWARE

defined, a cut image may be reproduced anywhere on the screen. It can be enlarged, reduced, or reversed, and colors can be changed.

The Disk option lets you get a picture or font from the utility disk, save a picture, format a new disk, and delete a file.

With the Alpha mode, you can add text to your picture. Errors are easily corrected, microspacing (one pixel at a time) can be done in all four directions, and fonts can be combined at will. The program uses standard ASCII characters as a default, but 14 other sets are available. Included is a character set of small pictures of envelopes, fire extinguishers, tools, chess pieces, people, and other images.

The other choices available on the Graphic Design menu are fairly straightforward: Clear clears the screen, and Fill fills it or an enclosed portion with the current color. Micro confines cursor movement to a 2- by 2-inch square to allow more detailed freehand drawing, and Grids lets you create a grid overlay to help align the various elements of your drawing. Draw allows freehand sketching, and Box, Circle, and Curves produce these figures automatically.

Text Slides

The Text Screen Editor provides an efficient way to create text slides. You can enter text in normal, inverse, or flash mode. And you can store up to 90 text slides on a single disk.

The Presentation Program lets you view your designs on-screen. You can specify the order in which your pictures will be displayed, how long each will be on-screen (3 to 99 seconds), and whether to blend one image into another.

Presentations can be automatic and continuous, or set to advance one slide at a time forward or backward. And you can add an on-screen message that notifies you when it's time to change disks, which is necessary if a presentation contains more than 14 high-resolution images. I'd like to see a way to link disks more smoothly, so that, for example, after the slides in drive 1 have been

displayed, the program would automatically begin showing the slides on file in drive 2. Despite this minor flaw, however, the Presentation Program is a winner.

With the Printout Program you can load the "slide tray" with up to 10 of the slides contained on a disk, print them in any order, and set different printing parameters for each.

AT A GLANCE

Digital Paintbrush

Manufacturer

The Computer Colorworks
Suite 201
3030 Bridgeway
Sausalito, CA 94965
(415) 331-3022, (800) 874-1888

Price and Hardware Requirements

\$299; Apple II Plus, IIe, and IIc, requires 64K bytes of user memory. \$450; IBM PC, XT, AT, and compatibles, requires game control adapter, color card, and 256K bytes of user memory

Audience

Graphics designers, small businesses, the scientific community, and compulsive doodlers

Reviewer's Note

Except for the inordinate amount of desk space this package requires, it's a handy graphics tool

You can also review your slides on-screen before printing. Unlike most screen-dump programs, the Digital Paintbrush lets you print as many as 10 different high-resolution pictures at once, specify different printing characteristics for each, and do it all from a single data-entry point.

Art by Phone

The Graphics/Telephone Program has two main sections—Graphics and Transport. With the former, which you'd use more to edit than to create designs, you can draw freehand; create circles, squares, and rectangles; fill areas; add text (uppercase ASCII characters only); and capture a portion of an image that you wish to move or copy to different areas of the screen.

From the Transport menu you can instruct the program to dial a number immediately or with a time delay. Once linked, you and your party,

who must also be using Digital Paintbrush, can transfer files and draw interactively on-screen. A Note mode lets you type messages without affecting the drawing.

There's More

Three utility programs are included. The Picture Compressor enables you to store and transmit high-resolution images more economically. The Restore option returns them to original size.

Graph Grabber lets you work with graphics created with programs that do not store screen images as standard binary files. And the Area Management Program enables you to draw or trace shapes and determine their areas in either pixels or units you specify and standardize.

The manual is well written and well designed. No tutorials are provided, but the numerous tips and hints for drawing, improving presentations, and using the telephone program and drawing device more than compensate.

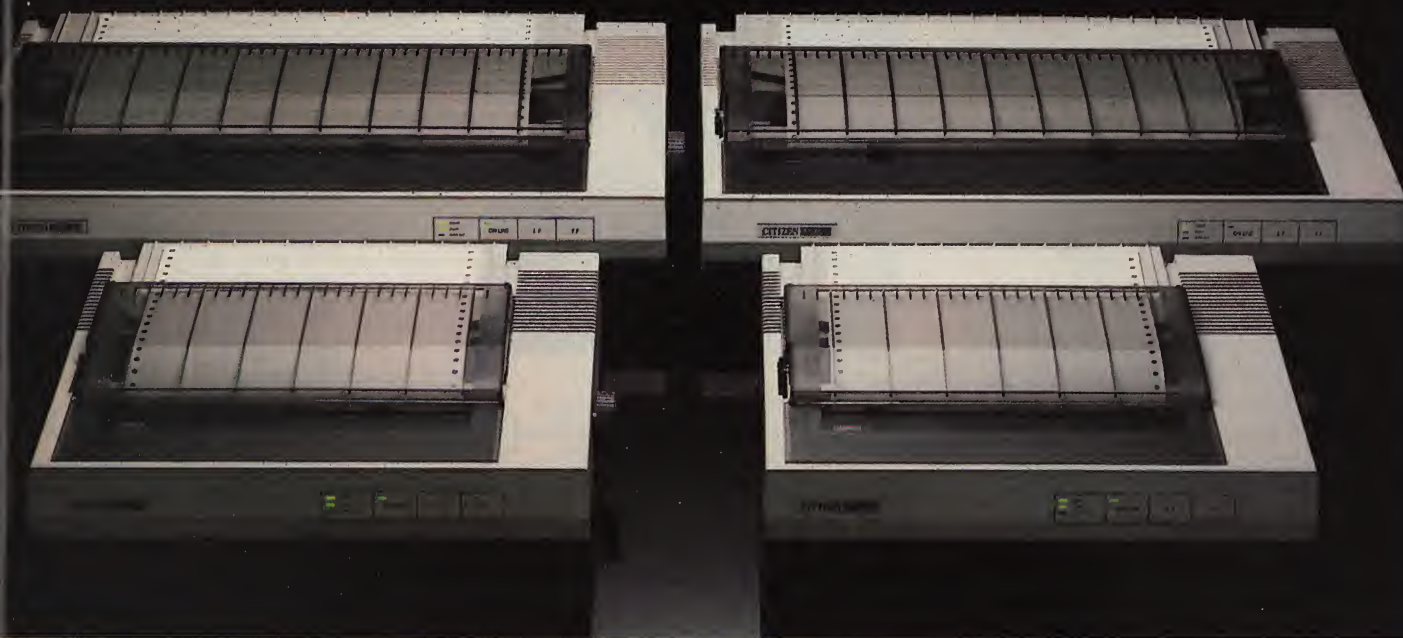
Yet no matter how simple the manual claims it is to use the input device, my experience proved otherwise. I felt chained to its Dacron lines and hard-pressed to draw easily with the pen.

Another gripe I have is the desk space required to use this system. In order to maintain proper orientation, you should place the input device directly in front of the keyboard. The Apple computer measures about 18 inches from front to back, the Paintbrush housing occupies another 8 inches or so, and the largest drawing area—the space between you and the housing—takes up 10 more inches. That's more desk space than most people have.

Despite these few drawbacks, the Digital Paintbrush System can do a lot, but then you'd expect that for \$300. Most operations are easy to perform, and menus are clear and attractive. Many people will undoubtedly appreciate the program as a time- and effort-saving tool for designing, viewing, and printing graphics. —WAYNE J. SASSANO

Wayne J. Sassano is a Connecticut-based communications consultant.

SOLID CITIZENS.



Presenting four upstanding Citizens who give faithful service above and beyond the call of duty. Citizen™ dot matrix printers, precision-engineered by the people who've become a wristhold word in fine, precision-engineered watches.

The Citizens are sleek, quiet, and reliable. They're extremely easy to use. And feature a unique push-feed paper system that makes paper loading a breeze. What's more, the Citizens are IBM® and Epson®-compatible. Can print graphics.

Can dash out output at 160 cps (40 cps correspondence-quality) or a blazing 200 cps (50 cps correspondence quality). And offer the industry's longest warranty—18 months on all parts and labor.

The Citizen MSP-10/15 and MSP-20/25. Four solid reasons to stop by your dealer.

And watch what the Citizens can do for you.

For more information, call 1-800-556-1234, Ext. 34.

In California, 1-800-441-2345, Ext. 34. Or write Citizen America Corporation,
2425 Colorado Avenue, Santa Monica, CA 90404.

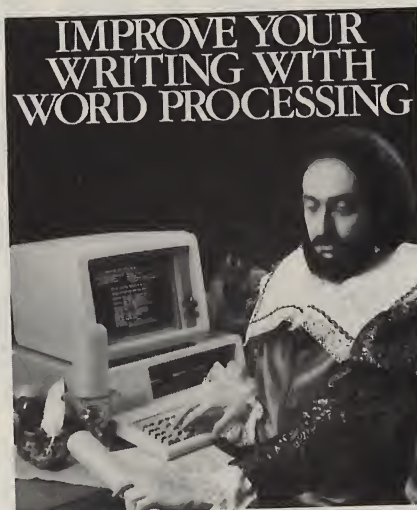


CITIZEN™



©1985 Citizen America Corporation. Citizen and the Citizen logo are trademarks of Citizen Watch Co., Ltd. IBM is a registered trademark of International Business Machines Corporation. Epson is a registered trademark of Epson Corporation.

POPULAR REVIEWS BOOKS



Customizing the Word Processor

Improve Your Writing with Word Processing

by David F. and Virginia Noble
Que Corp., Indianapolis, 1984,
406 pages, paper \$12.95

Like the technology it reports on, the literature about personal computing seems to evolve in identifiable stages. Word processing is an example. First came the gee-whiz books that promoted the magical qualities of computer-aided writing. Then a second generation of books either laid bare the anatomy of the latest best-selling program or charted the features in 50 different ones.

Although those books are by no means obsolete, we wonder what's next. For starters, there are people who punch away at keyboards trying to make a living. First- and second-generation books focus on new technology rather than the human beings who use it. But *Improve Your Writing with Word Processing*, by David and Virginia Noble, may signal the arrival of a third generation of personal computing books. Its starting point, reflecting the authors' backgrounds in teaching literature and creative writing, is not how word processors work, but how people write and how to marry this craft to electronic editing techniques.

The success of that marriage, the Nobles argue, depends on the development and use of sophisticated macros: user-defined keystroke sequences that are stored on disk and recalled any time simply by pressing a key or two. Creative macros can thoroughly customize a word-processing program, and you will quickly appreciate that the Nobles elevate macro making to an art.

Step by step, the authors show you

how to add macro-based power to most popular word processors. You'll learn to build macros that move the cursor by leaps and bounds; mark a sentence or paragraph for moving; reformat an entire file after insertions and deletions have distorted the right margin; transpose adjacent words, phrases, sentences, and paragraphs; or remove all end-of-line carriage returns that may prevent quick reformatting.

As useful as those automated procedures are, the heart of the book is the "blockbuster" macros that break paragraphs into separate sentences for better analysis and revision. Related chapters present strategies for analyzing and rewriting those shattered paragraphs to achieve better unity, order, coherence, and development. Examples of published paragraphs with the right stuff, hands-on practice in writing paragraphs and revising sentences, and suggestions for developing ideas when you begin to write are all included.

These suggestions are not vague generalizations to inspire the eager young writer. They are well-developed techniques for diagnosing and treating the weak sentences and paragraphs that often dilute good ideas. The book covers such basics as sentence and paragraph transitions and also reviews parts of speech, punctuation, and principles of grammar. The net effect is a feeling that somewhere in this book is a solution to every writing dilemma—except having nothing to say.

Of course, after applying all these principles, strategies, and rules, you have a bunch of fragmented but highly polished sentences where once there were paragraphs. Fortunately, the Nobles also provide "block rebuilding" macros for reassembly into paragraphs.

Improve Your Writing with Word Processing should appeal to anyone who bought an IBM PC or compatible to produce better-quality documents and is willing to practice disciplined prose polishing to achieve even more. The Nobles weave their almost magical macros through a fabric of solid and well-written advice about the writing craft. This book is a step beyond the average catalog of tips for writers or the usual technical manual on effective word processing. Such a highly refined guide to creative editing is a bargain at \$12.95.

—CHARLES SPEZZANO

Dr. Charles Spezzano writes about topics in psychology and personal computing and is a frequent contributor to *Popular Computing*.

READER SERVICE

Fill out this coupon carefully. PLEASE PRINT. Requests cannot be honored unless the zip code is included. This card is valid for 6 months from cover date.

NAME _____ First _____ Last _____

TITLE _____ COMPANY _____

ADDRESS _____ TELEPHONE _____

CITY _____ STATE _____ ZIP CODE _____

I PURCHASED THIS COPY BY ☐ Subscription ☐ Newsstand, computer store, or bookstore

1 11 21 31 41 51 61 71 81 91 101 111 121 131 141 151 161 171 181 191 201 211 221 231 241 251 261 271 281 291
2 12 22 32 42 52 62 72 82 92 102 112 122 132 142 152 162 172 182 192 202 212 222 232 242 252 262 272 282 292
3 13 23 33 43 53 63 73 83 93 103 113 123 133 143 153 163 173 183 193 203 213 223 233 243 253 263 273 283 293
4 14 24 34 44 54 64 74 84 94 104 114 124 134 144 154 164 174 184 194 204 214 224 234 244 254 264 274 284 294
5 15 25 35 45 55 65 75 85 95 105 115 125 135 145 155 165 175 185 195 205 215 225 235 245 255 265 275 285 295
6 16 26 36 46 56 66 76 86 96 106 116 126 136 146 156 166 176 186 196 206 216 226 236 246 256 266 276 286 296
7 17 27 37 47 57 67 77 87 97 107 117 127 137 147 157 167 177 187 197 207 217 227 237 247 257 267 277 287 297
8 18 28 38 48 58 68 78 88 98 108 118 128 138 148 158 168 178 188 198 208 218 228 238 248 258 268 278 288 298
9 19 29 39 49 59 69 79 89 99 109 119 129 139 149 159 169 179 189 199 209 219 229 239 249 259 269 279 289 299
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300
JUNE 1985

READER SERVICE

Fill out this coupon carefully. PLEASE PRINT. Requests cannot be honored unless the zip code is included. This card is valid for 6 months from cover date.

NAME _____ First _____ Last _____

TITLE _____ COMPANY _____

ADDRESS _____ TELEPHONE _____

CITY _____ STATE _____ ZIP CODE _____

I PURCHASED THIS COPY BY ☐ Subscription ☐ Newsstand, computer store, or bookstore

1 11 21 31 41 51 61 71 81 91 101 111 121 131 141 151 161 171 181 191 201 211 221 231 241 251 261 271 281 291
2 12 22 32 42 52 62 72 82 92 102 112 122 132 142 152 162 172 182 192 202 212 222 232 242 252 262 272 282 292
3 13 23 33 43 53 63 73 83 93 103 113 123 133 143 153 163 173 183 193 203 213 223 233 243 253 263 273 283 293
4 14 24 34 44 54 64 74 84 94 104 114 124 134 144 154 164 174 184 194 204 214 224 234 244 254 264 274 284 294
5 15 25 35 45 55 65 75 85 95 105 115 125 135 145 155 165 175 185 195 205 215 225 235 245 255 265 275 285 295
6 16 26 36 46 56 66 76 86 96 106 116 126 136 146 156 166 176 186 196 206 216 226 236 246 256 266 276 286 296
7 17 27 37 47 57 67 77 87 97 107 117 127 137 147 157 167 177 187 197 207 217 227 237 247 257 267 277 287 297
8 18 28 38 48 58 68 78 88 98 108 118 128 138 148 158 168 178 188 198 208 218 228 238 248 258 268 278 288 298
9 19 29 39 49 59 69 79 89 99 109 119 129 139 149 159 169 179 189 199 209 219 229 239 249 259 269 279 289 299
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300
JUNE 1985

READER SERVICE

Fill out this coupon carefully. PLEASE PRINT. Requests cannot be honored unless the zip code is included. This card is valid for 6 months from cover date.

NAME _____ First _____ Last _____

TITLE _____ COMPANY _____

ADDRESS _____ TELEPHONE _____

CITY _____ STATE _____ ZIP CODE _____

I PURCHASED THIS COPY BY ☐ Subscription ☐ Newsstand, computer store, or bookstore

1 11 21 31 41 51 61 71 81 91 101 111 121 131 141 151 161 171 181 191 201 211 221 231 241 251 261 271 281 291
2 12 22 32 42 52 62 72 82 92 102 112 122 132 142 152 162 172 182 192 202 212 222 232 242 252 262 272 282 292
3 13 23 33 43 53 63 73 83 93 103 113 123 133 143 153 163 173 183 193 203 213 223 233 243 253 263 273 283 293
4 14 24 34 44 54 64 74 84 94 104 114 124 134 144 154 164 174 184 194 204 214 224 234 244 254 264 274 284 294
5 15 25 35 45 55 65 75 85 95 105 115 125 135 145 155 165 175 185 195 205 215 225 235 245 255 265 275 285 295
6 16 26 36 46 56 66 76 86 96 106 116 126 136 146 156 166 176 186 196 206 216 226 236 246 256 266 276 286 296
7 17 27 37 47 57 67 77 87 97 107 117 127 137 147 157 167 177 187 197 207 217 227 237 247 257 267 277 287 297
8 18 28 38 48 58 68 78 88 98 108 118 128 138 148 158 168 178 188 198 208 218 228 238 248 258 268 278 288 298
9 19 29 39 49 59 69 79 89 99 109 119 129 139 149 159 169 179 189 199 209 219 229 239 249 259 269 279 289 299
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300
JUNE 1985

READER FEEDBACK is your direct line to the editor's desk. To help us provide the best editorial material possible, we ask readers to rate the articles in each month's issue. To cast your vote, first look at the list of articles presented in this issue and their corresponding article numbers (located under the section entitled Reader Feedback), then rate each article as **Excellent, Good, Fair, or Poor.**

Article No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Excellent	1	5	9	13	17	21	25	29	33	37	41	45	49
Good	2	6	10	14	18	22	26	30	34	38	42	46	50
Fair	3	7	11	15	19	23	27	31	35	39	43	47	51
Poor	4	8	12	16	20	24	28	32	36	40	44	48	52

Article no.	14	15	16	17	18	19	20	21	22	23	24	25
Excellent	53	57	61	65	69	73	77	81	85	89	93	97
Good	54	58	62	66	70	74	78	82	86	90	94	98
Fair	55	59	63	67	71	75	79	83	87	91	95	99
Poor	56	60	64	68	72	76	80	84	88	92	96	100

READER FEEDBACK is your direct line to the editor's desk. To help us provide the best editorial material possible, we ask readers to rate the articles in each month's issue. To cast your vote, first look at the list of articles presented in this issue and their corresponding article numbers (located under the section entitled Reader Feedback), then rate each article as **Excellent, Good, Fair, or Poor.**

Article No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Excellent	1	5	9	13	17	21	25	29	33	37	41	45	49
Good	2	6	10	14	18	22	26	30	34	38	42	46	50
Fair	3	7	11	15	19	23	27	31	35	39	43	47	51
Poor	4	8	12	16	20	24	28	32	36	40	44	48	52

Article no.	14	15	16	17	18	19	20	21	22	23	24	25
Excellent	53	57	61	65	69	73	77	81	85	89	93	97
Good	54	58	62	66	70	74	78	82	86	90	94	98
Fair	55	59	63	67	71	75	79	83	87	91	95	99
Poor	56	60	64	68	72	76	80	84	88	92	96	100

READER FEEDBACK is your direct line to the editor's desk. To help us provide the best editorial material possible, we ask readers to rate the articles in each month's issue. To cast your vote, first look at the list of articles presented in this issue and their corresponding article numbers (located under the section entitled Reader Feedback), then rate each article as **Excellent, Good, Fair, or Poor.**

Article No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Excellent	1	5	9	13	17	21	25	29	33	37	41	45	49
Good	2	6	10	14	18	22	26	30	34	38	42	46	50
Fair	3	7	11	15	19	23	27	31	35	39	43	47	51
Poor	4	8	12	16	20	24	28	32	36	40	44	48	52

Article no.	14	15	16	17	18	19	20	21	22	23	24	25
Excellent	53	57	61	65	69	73	77	81	85	89	93	97
Good	54	58	62	66	70	74	78	82	86	90	94	98
Fair	55	59	63	67	71	75	79	83	87	91	95	99
Poor	56	60	64	68	72	76	80	84	88	92	96	100

PLACE
STAMP
HERE

**POPULAR
COMPUTING**

Reader Service
P.O. Box 301
Dalton, MA 01226

PLACE
STAMP
HERE

**POPULAR
COMPUTING**

Reader Service
P.O. Box 301
Dalton, MA 01226

PLACE
STAMP
HERE

**POPULAR
COMPUTING**

Reader Service
P.O. Box 301
Dalton, MA 01226

READER SERVICE

To get further information on the products advertised in Popular Computing, either pick up your touch-tone telephone and use TIPS by following the instructions below (if you are a subscriber), or fill out the reader service card with your name and address. Then circle the appropriate numbers for the advertisers you select from the list. Add a 22-cent stamp to the card, then drop it in the mail.

*Correspond directly with company. This index is provided as an additional service by the publisher, who assumes no liability for errors.

Reader Feedback Section on page 150

POPULAR COMPUTING SUBSCRIBERS * use Telephone Inquiry Processing System

Using TIPS can bring product information as much as 10 days earlier.

1) If you are a new subscriber or have lost your I.D. card, circle #1 on the Reader Service Card, please **attach your mailer label**. We will send your personal TIPS subscriber card.

- 2) Write your Subscriber Number, as printed on your Subscriber I.D. Card, in boxes in Step 5 below.
(Do not add 0's to fill in blank boxes)
- 3) Write numbers for information desired in boxes in Step 7b below.
(Do not add 0's to fill in blank boxes.)

4) Now, on a Touch-Tone telephone dial: **(413) 442-2668** and wait for voice commands.

5) When TIPS says: "Enter Subscriber Number"
 (Enter by pushing the numbers and symbols [# or * enclosed in the boxes] on telephone
 pad ignoring blank boxes)
 Enter # #

6) When TIPS says "Enter magazine code & issue code"
 Enter # # #

7a) When TIPS says "Enter (next) Inquiry Number"
Enter one inquiry selection from below (ignore blank boxes)

b) Repeat 7a as needed (maximum 17 inquiry numbers)

1. ☐ ☐ ☐ ☒ ☒ 6. ☐ ☐ ☐ ☒ ☒ 10. ☐ ☐ ☐ ☒ ☒ 14. ☐ ☐ ☐ ☒ ☒
2. ☐ ☐ ☐ ☒ ☒ 7. ☐ ☐ ☐ ☒ ☒ 11. ☐ ☐ ☐ ☒ ☒ 15. ☐ ☐ ☐ ☒ ☒
3. ☐ ☐ ☐ ☒ ☒ 8. ☐ ☐ ☐ ☒ ☒ 12. ☐ ☐ ☐ ☒ ☒ 16. ☐ ☐ ☐ ☒ ☒
4. ☐ ☐ ☐ ☒ ☒ 9. ☐ ☐ ☐ ☒ ☒ 13. ☐ ☐ ☐ ☒ ☒ 17. ☐ ☐ ☐ ☒ ☒
5. ☐ ☐ ☐ ☒ ☒

8) End session by entering * * 9 1 # #

9) Hang up after hearing final message

If you are a subscriber and need assistance, call (603) 924-9281.

Available 24 Hours,
7 Days a Week

If you are not a subscriber fill out the subscription card found in this issue or, call POPULAR COMPUTING Circulation 800-258-5485.

**Domestic and Canadian subscribers only!*

POPULAR REVIEWS BOOKS

MICRO REVIEWS

The Sachertorte Algorithm: And Other Antidotes to Computer Anxiety

John Shore

Viking, New York, 1985, 272 pages,
paper \$16.95

John Shore loves quotations. His book, which explains the programming role of algorithms with a torte recipe, is peppered with sayings from personages as diverse as Ralph Waldo Emerson and Edsger Dijkstra. Unfortunately, if any quotation applies to Shore's own effort, it is the one attributed to Tallulah Bankhead: "There's less in this than meets the eye." The author speaks from his experience at the Naval Research Laboratory on several broad, introductory topics, with the noble intention of promoting "a more general understanding of computers." Computer anxiety, the virtues of correct programming style, and the vices of artificial intelligence research are just a few of the subjects under Shore's critical gaze. But his observations aren't as engaging as his points of departure. The trite recipe analogy in the book's own title is characteristic of a text that's missing one essential ingredient: originality. The computer novices to whom this book is directed would do well to heed the first few lines of its preface. They pose a question that the book doesn't answer: "There are, you may have noticed, other books about computers. Why another one?"

Expanding Your IBM PC: A Guide for the Beginner

Bill Alvernaz

Brady, Bowie, MD, 1985, 233 pages,
paper \$19.95

Alvernaz, whose expanded IBM PC is very different from the original model he purchased, shares his expertise with readers who, by doing it themselves, want to "learn a lot, have some fun, discover a new world . . . and save a considerable amount of money." This is not a guide to selecting or using the IBM PC, but to adding assorted enhancements, primarily hardware. With this

distinctive focus, *Expanding Your IBM PC* is one of the few places where nontechnical computerists can read about RAM disks, multi-function cards, and 8087 Numerical Data Processors. From mice to voice synthesis, Alvernaz provides a good sampling of PC peripherals. But this focus on the needs of the non-technical beginner also muddies the book's purpose. On one hand, Alvernaz introduces the reader to the range of optional peripherals; on the other, he attempts to show how these devices are actually installed. In attempting to faithfully concentrate on both topics, Alvernaz frequently ends up providing a superficial introduction to a major expansion and then following it with an equally superficial set of installation instructions. As it turns out, the book's strong point is not the step-by-step instructions, but its discussion of the actual availability of optional hardware. On this basis alone, this guide merits every serious PC user's consideration.

Bit by Bit: An Illustrated History of Computers

by Stan Augarten

Ticknor & Fields, New York, 1984,
324 pages, paper \$17.95

With computer histories suddenly in vogue, it's refreshing to find one that manages to bring something extra to the fad. The "extra" in the case of Augarten's *Bit by Bit* is not so much the book's striking illustrations, which are wonderful in their own right, but its text. Augarten has examined the nooks and crannies of the traditional histories and come up with some revisionist discoveries like the real inventor of the first mechanical calculator (not Blaise Pascal but Wilhelm Schickard), the origins of Thomas Watson Sr.'s "Think" slogan (borrowed from Watson's old boss at NCR, John Patterson), and the first kit computer offered to the public (not the Altair 8800, but Jonathan Titus's Mark-8). The author also recounts the famous and infamous lives of the Babbages and Turings against the backdrop of technological progress. This readable, beautifully designed history

makes current developments in computer technology resonate with the past achievements that made them possible.

Advanced Programmer's Guide Featuring dBASE III and dBASE II

Luis Castro, Jay Hanson,
and Tom Rettig

Ashton-Tate, Culver City, CA, 1985,
664 pages, paper \$28.95

Numerous publications already are dedicated to programmers who want to fully exploit the features of dBASE II and dBASE III. This special audience will be happy to learn that they can now dispense with many of these works and replace them with a single one: Ashton-Tate's new *Advanced Programmer's Guide*. Considering its advanced character, much of the early material—on operating systems, languages, and programming concepts—seems misplaced and unrelated to database management. But after this general discussion the text turns to some of the pitfalls of database design, such as repeating fields, and a meticulous discussion of dBASE II and dBASE III features. Virtually all topics of interest to dBASE programmers, from file-updating techniques to security and recovery considerations, are covered lucidly. Unfortunately, the text usually presents hypothetical examples rather than immediately useable dBASE code. This shortcoming, however, is more than overcome by appendices with a useful variety of dBASE subroutines and programs and a collection of assembly-language subroutines that can be called from a dBASE command file. The emphasis here is on utilities that either speed program development or allow the user to fully exploit operating system features. The high price of *Advanced Programmer's Guide* reflects its high quality—this is the definitive guide to programming Ashton-Tate's two database management systems.

—MIKE NICITA & RON PETRUSHA

Mike Nicita and Ron Petrusa are coauthors of *The Reader's Guide to Microcomputer Books*, 2nd ed. (Golden-Lee, 1984).

ASK POPULAR

Readers ask about monitors, peripherals, computer compatibility, and software

WHY IS A COLOR MONITOR SUPERIOR to a color television?

—**RICK HICKMAN II**
MELVINDALE, MI

MONITORS ARE DESIGNED WITH more bandwidth, or the amount of frequency space available to carry the color signal. Simply put, increased bandwidth accommodates more pixels and sharpens the image. On color televisions, the bandwidth is limited to 3.58 megahertz; this is necessary to avoid interference between adjacent television channels. This bandwidth will produce readable 40-column text but is not sufficient for an 80-column line and true high resolution.

A monitor requires no channel spacing, and the computer video signal feeds directly into the amplifiers that drive the picture tube. Bandwidths range from 4 or 5 MHz in low-cost color monitors up to 25 MHz in the more expensive RGB (red-green-blue) models. Therefore, monitor displays—both text and graphics—are sharper.

However, some manufacturers have added a computer video input to their television sets. It bypasses the bandwidth-limiting circuits and allows TV display of 80-character text and high-resolution graphics. Panasonic, Sanyo, and Sears make such sets.

Remember that a higher-resolution monitor won't necessarily increase the graphic resolution of a given program. That is determined by the software and the memory the computer allocates for graphic displays. Before buying a color monitor, try to get a demonstration with the type of software that you generally use. Increased resolution is quite significant for some applications, not

so important for others—and a little bandwidth can make a lot of difference in price. A firsthand look will help you select the best monitor for your needs.

WHY CAN'T AN APPLE IIe WORD-processing program run on an IBM-compatible personal computer?

—**LIONEL GARCIA, D.V.M.**
SEABROOK, TX

IBM PC COMPATIBLES AND THE APPLE IIe have different microprocessors with different instruction sets. A program written for one computer won't recognize the strange instructions from the other. You might transfer the program from the Apple to the PC compatible by connecting the serial ports and using a communications program to upload or download. But having the Apple program on the PC disk format still won't make it run.

Quadram Corp. (4355 International Blvd., Norcross, GA 30093; (404) 923-6666) sells Quadlink, a peripheral card that allows some Apple software to run on the IBM PC and some compatibles. The card lists for \$495 and contains the 6502 microprocessor used in the Apple. In effect, it transforms the PC into an Apple.

However, because of significant differences in the disk drives, some copy-protected Apple software will not work. Also, Apple software that requires specific peripheral cards will not run properly. Check with Quadram to be sure that your software will function with its card in your PC compatible.

Of course, the easiest and most economical solution would be to buy a separate word processor for the IBM compatible.

I NEED TO CONNECT THREE IBM PC portable computers to three printers, two with parallel ports and one with a serial port. Ideally, I would like to connect any PC to any printer without having to plug and unplug cables. Is there a suitable switching device on the market? Also, how can I feed the PC parallel output to a serial port?

—**DAVID F. AUSTIN**
RALEIGH, NC

SWITCHING DEVICES NORMALLY switch two computers to one printer, one computer to two printers, or one computer to a variety of serial or parallel peripherals. Because you have a printer for each computer, you should reassess the need for any switching. However, let's consider your request.

The IBM PC and PC portable have a DB-25 connector for the parallel output port. This connector is normally used with RS-232C serial interface ports, but its pins are wired differently on the PC. Parallel printers normally have a 37-pin Centronics-type parallel input connector. A switch with this combination of connections is not readily available.

Also, devices to switch between three input and three output devices are hard to find. When one of them is wired for serial rather than parallel, the search becomes more difficult. A commercially available switch, "X-Switch," allows interchange of two pairs of devices. One model, sold by Black Box Corp. (POB 12800, Pittsburgh, PA 15241; (412) 746-5500) conforms to the IBM PC DB-25 parallel printer interface. The catalog number is J-SW017 and it sells for \$155. A parallel printer adapter cable (catalog number J-EY600, \$27.14) will connect the

ASK POPULAR QUESTIONS & ANSWERS

DB-25 output of the switch to the Centronics connector on your parallel printers.

If the serial printer is dedicated to the remaining PC portable, all you need is a means to convert the computer's parallel output to serial. Several devices will plug into a parallel port and convert it to serial. One is sold by Tigertronics (2734-C Johnson Dr., POB 3717, Ventura, CA 93006; (805) 658-7466). Model 775 converts parallel to serial and costs \$89.95. An extra \$10 connector option lets you specify the exact parallel connector required by the IBM PC portable. However, its input is a Centronics-type connector, and an adapter cable similar to the Black Box J-EY600 is needed. Check with Black Box Corp. for proper connections.

ARE THERE ANY APPLE IIe PACKAGES for putting sounds and music into your own programs?

—ADAM STEIN
EDISON, NJ

YES. MUSIC GENERATION METHODS for the Apple fit into two categories: those using only internal software and the Apple speaker, and those using an accessory card with external speakers. Let's see how these two groups differ.

A program that toggles the Apple's speaker on and off a specific number of times per second will generate music if the toggle frequency corresponds to the frequency of the desired note. BASIC instructions are too slow for an acceptable frequency range, so machine language is required. A music subroutine can be called from a BASIC program.

A good discussion of the programming techniques for generating music is in *Apple II Assembly Language Exercises* by Leo J. Scanlon (John Wiley & Sons, 1982, \$12.95). A commercial program, Music Construction Set (\$40) from Electronic Arts (2755 Campus Dr., San Mateo, CA 94403; (415) 571-7171) will teach you the basics of musical notation and composing pieces for graphic and sound presentations.

Unfortunately, software alone is

limited by the Apple's sound generating capabilities. The small speaker has a narrow range, and software can usually produce only two simultaneous notes. Adding a music card greatly enhances sound reproduction and range with multiple voices and stereo.

These hardware cards contain chips that generate sound effects and music, with enough power to drive a stereo amplifier. Because these devices need little processor time once they are triggered, the Apple is free to execute the rest of the program. Thus, animation and other graphics can be synchronized with the music. Suitable music cards include the Echo Plus (\$149.95) from Street Electronics (1140 Mark Ave., Carpinteria, CA 93013; (805) 684-4593); the Mockingboard (\$99) from Sweet Microsystems (50 Freeway Dr., Cranston, RI 02920; (401) 461-0530); the Music Card MC1 (\$169) from Alf Products (1315F Nelson St., Denver, CO 80215; (303) 234-0871), and the Soundmaster II (\$49.95) from Kearsarge Industries (12310 Pinecrest Rd., Reston, VA 22091; (703) 620-5760).

I AM STARTING A SYSTEMS ANALYSIS project and would like some information on inventory software packages.

—SUE ANN GARRY
KALAMAZOO, MI

AN INVENTORY CONTROL SYSTEM is a virtual necessity for modern business and is a significant part of automated accounting. While such systems can be configured from a general database management system, they are often enhanced with general ledger, order entry, and accounts receivable capability, the ability to track inventory quantity and value, and status reporting.

Some representative software packages include Versa Inventory (\$99.95) from Computronics (50 North Pascack Rd., Spring Valley, NY 10977; (800) 431-2818); Inventory (\$495, Apple; \$595, IBM PC) from State of the Art (3191-C Airport Loop, Costa Mesa, CA 92626; (714) 850-0111), and The Store Manager (\$295, Apple; \$595, IBM PC) from

High Technology Software Products (8200 North Classen Blvd., POB 60406, Oklahoma City, OK 73114; (405) 848-0480).

I HAVE A FRANKLIN 1000 WITH 64K bytes of RAM. Is hardware available to expand the memory to 128K bytes and to add a clock for logging programs? —R. L. REDPATH
READING, PA

YES. MANY OF THE APPLE II SERIES memory expansion and clock cards will function perfectly with your Franklin 1000, although cards designed for the Apple IIe auxiliary slot aren't compatible. Memory expansion cards include the Titan 32K, 64K, and 128K RAM cards from Titan Technologies (310 West Ann St., Ann Arbor, MI 48104; (313) 662-8542); Macromem-3 from Macro-tech Computer Products (1374 Marine Dr., North Vancouver, Canada V7P 1T4; (604) 984-9305); and 16K and 128K RAM cards from Prometheus Products (4545 Cushing Pkwy., Fremont, CA 94538; (415) 490-2370).

Adding RAM cards to your Franklin (or Apple) will not automatically increase usable memory. The 6502 microprocessor in both computers can address only 64K bytes at one time. Your software must select the desired bank of additional memory. This technique, called "bank switching," is included in the software supplied with the memory cards.

Clock cards contain a real-time clock/calendar chip with a battery backup. They keep track of the time, the days of the week, and even account for leap year. They're also useful for accessing databases automatically, timing experiments, and control applications. Two such cards are Thunderclock from Thunderware (21 Orinda Way, Orinda, CA 94563; (415) 254-6581) and Time-master II H. O. from Applied Engineering (POB 798, Carrollton, TX 75006; (214) 492-2027). □

Ask Popular is a monthly column conducted by contributing editors Harv Weiner and Steve Ciarcia to answer general questions about small computers. Send your questions to: Ask Popular, POB 397, Hancock, NH 03449.

I*U*CO is the best thing to happen to personal computing since the personal computer.

I*U*CO is an idea whose time has come.

I*U*CO is the International Union of Computer Owners, an organization designed to protect the interests of computer owners and users against those who would take their money...and then deliver less than they promised.

Here's an overview of some of the vital services I*U*CO provides:

1. Access to the lowest priced, reputable vendor for nearly every computer related need; and,
2. Protection from the rip-off artists, vaporware specialists, false advertisers and other creepy, crawly creatures who have been attracted to the computer industry by the scent of your money; and,
3. Constantly updated information on software and hard-

ware releases, bug reports, fixes and other data individually tailored to your needs through I*U*CO's exclusive Computer Registry; and,

4. Finally, a chance to get even with those characters out there who promise a lot, take your money and then deliver less than they promised.

I*U*CO: a lynch mob with a purpose.

Every computer owner has been ripped off at least once.

Or maybe a dozen times might be a more appropriate number.

In any event, we've all been victimized by the computer industry.

And it wasn't accidental: today's computer industry is filled with hypesters, rip-off artists, vaporware specialists and others whose sole function in life is to part you from your money...while delivering less than you bargained for.

The rip-off might have been a computer that wasn't quite as "compatible" as claimed. Or a computer that didn't quite get delivered at the same time as the "hundreds" of new programs that would support it.

Or it might have been a software package that didn't quite live up to its advertising hype. Possibly, you've been had by a software manufacturer who continuously upgrades their software...charging you a pretty penny for an updated version that simply gets rid of the bugs that shouldn't have been there in the first place.

In a few cases, it might even have been a vendor who took your money...and never quite got around to delivering what you paid for.

In any event, owning a computer has been an open invitation to getting ripped-off in one way or another.

Until now.

I*U*CO means protection.

I*U*CO subscribes to some very ancient wisdom: in numbers, there is strength.

Labor unions learned it a long time ago.

An individual worker had no bargaining power. All the workers in a factory, however, have a lot of muscle.

Automobile owners learned it early on. The American Automobile Association was originally organized to bring motorists together in order to lobby for new roads and highways.

Even the computer industry has learned it: computer manufacturers, software publishers and others in the industry have now banded together in order to get legislative approval for their meaningless "disclaimers" and to restrict your right to copy the software you've purchased.

I*U*CO is designed to be what every collective organization is: a means to protect the special interests of its members.

And, in this case, the members are the victims...the people who own and use personal computers.

The people who, until now, have been powerless.

First of all, I*U*CO means low prices.

The first benefit an I*U*CO member gets is the opportunity to save money.

Lots of it.

I*U*CO maintains a database of every mail-order advertisement that appears in the major computer magazines.

When you want the lowest price on something, just

(electronically) mail your shopping list to I*U*CO.

Within a day, you'll get the three lowest and most recently quoted prices...and, quite possibly, some still lower prices that haven't been published at all.

I*U*CO protects you.

Of course, buying mail order can get you more than low prices.

It can also get you a lot of problems in delivery.

So, along with the low price quotation, you also get I*U*CO member evaluations and reports about the vendor...and, to make sure that you'll be happy with the product, a bibliography of reviews, articles and letters to the editor about the product or service you want to buy!

In short, as an I*U*CO member, you not only find the lowest price...but you might also find out that you don't really want to spend the money in the first place!

These are the first steps in I*U*CO's program:

1. Getting you the lowest possible prices.
2. Giving you an assessment of the potential vendor.
3. Providing information on the actual use value of the product. (*An awful lot of products sound better in their advertising than they are in reality. That's why so few companies offer a money-back guaranty.*)

Continuing protection from I*U*CO: the Computer Registry.

As an I*U*CO member, you can become part of our exclusive Computer Registry.

You simply register the appropriate information about all the hardware, software and peripherals you own with I*U*CO.

Then, as updates are announced, problems are discovered, fixes released and so on, you automatically get this information.

No more finding out a year after the fact that the current version of your program is 3.14...not the Version 1.7 program you've been using. Likewise, you might find out that the mysterious system error messages you've been getting aren't just your problem, but rather wide spread.

(As a personal note, this I*U*CO service is invaluable. In the early days of personal computers, hardware, software and peripheral manufacturers used to be pretty good about sharing information.

Today, they're not.

In the last few weeks, I personally have learned: a) my Macintosh 512K Upgrade is defective and won't work with MacPaint under certain circumstances; b) the ROMS in my Anadex printer have been upgraded; c) the ROMS in my IOMEGA Bernoulli box have been upgraded; d) MicroPro eliminated the copy protection on my version of Wordstar 2000 Plus; e) MicroPro had a bug in InfoStar for more than 18 months...and didn't tell anyone.

I*U*CO membership would have avoided these unpleasant surprises.)

With I*U*CO, you get the information you need on an individualized basis...and you get it fast.

You don't have to tear your hair out wondering about a problem. You might even find out about the problem before you encounter it!

I*U*CO: the iron fist.

The best part of I*U*CO has been saved for last.

Yes, I*U*CO will get you lower prices and will give you solid information about the integrity and usefulness of products and vendors.

But, more importantly, your membership in I*U*CO gives you the power of belonging to a community...a community of computer owners and users who need to protect their rights.

For instance, a group of software publishers recently managed to get the Louisiana legislature to pass a law "legalizing" the non-warranties they provide with their software. (You know, "this software is sold without any representations that it will work".)

I*U*CO will fight that kind of nonsense by lobbying against it.

Likewise, when a company...even a major company...announces vaporware, I*U*CO will use the same tools to fight back...to prevent publishers and dealers from getting us all aglow about a new machine or a new piece of software that won't be delivered for months. (For instance, how many people would have bought the Macintosh a year ago had they known that the "hundreds" of programs to be "shortly available" simply didn't exist?)

Finally, when the situation demands it, I*U*CO will be ready to sue. For example, what do you do in a situation where you run out and buy Wordstar 2000 Plus...only to find out later that its files are not compatible with the original Wordstar? (If you read the advertising, it doesn't say a word about it. You find out after you've laid your dollars on the table!)

There's a lot more to the I*U*CO story.

The whole story of I*U*CO and its benefits takes eight pages to tell. Ads...especially those that tell the truth...are expensive, so we can't take eight pages in this magazine to tell the whole story.

But, if you send us a buck, we'll send you the entire I*U*CO information and enrollment package.

You can make up your own mind whether it's a dollar well spent or not.

International Union Of Computer Owners, Inc.
Suite 4806
30 East Huron Street
Chicago, Illinois 60611

YES, I'm tired of being ripped off. Enclosed is \$1.00. Please send me the information and enrollment package for I*U*CO, the International Union of Computer Owners.

I understand that I am under no obligation to enroll.
**** PLEASE PRINT ALL INFORMATION ****

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

MAKE OF COMPUTER _____

I*U*CO International Union
of Computer Owners, Inc.

Suite 4806
30 East Huron Street
Chicago, Illinois 60611

IF ANY 3M, MAXELL, OR DYSAN FLOPPY DISK FAILS, WE'LL REPLACE IT WITH A NEW VERBATIM® DISK. FREE.

Most floppy disks come with a guarantee; if they ever fail, the manufacturer will send you a brand new one. But let's face it; if a particular brand of floppy disk ever loses your data, you might not want another one of theirs.

That's why Verbatim is offering a very special guarantee: If you buy a 3M, Maxell, or Dysan floppy disk — and it fails — we will replace it with a brand new Verbatim disk. Free. Why are we making this offer? Because we think it's time you use a floppy disk you can always count on. Verbatim.



© 1985 Verbatim Corporation

VERBATIM. YOU CAN COUNT ON US.

Mail your failed 8", 5¼", or 3½" disk in its original envelope, along with your name and address, and the brand and model of your computer system, to: Verbatim Offer, P. O. Box 7306, Clinton, IA 52736. Limit one refund per name and address. Offer limited to the first 100,000 3M, Maxell, or Dysan failed disks received. Offer expires October 1, 1985. Void where prohibited by law. Offer rights are not assignable or transferable.

NEW PRODUCTS

A fast, low-cost printer, plus other noteworthy new hardware and software

Hardware

PRINTERS



Versatile dot matrix: Using PICs (printer interface cartridges), the Epson Homewriter 10 links with most popular home computers, including Apple, IBM, Commodore and Atari. The matrix printer produces "near-letter-quality" print at 16 cps (characters per second) and draft quality at 100 cps. A variety of 10-dot matrix type styles is available, and such features as condensed, emphasized, and double-strike can be produced by software as well as buttons on the control panel. Included are a 1K-byte buffer and bidirectional printing. Paper is friction fed; optional tractor and cut-sheet feeders are available. Printer, \$269; PIC with cable, \$60. *Epson America, 2780 Lomita Blvd., Torrance, CA 90505.* [INQUIRY 200]

Economical letter quality: The Spinwriter Elf, designed for home and small business, operates quietly at 190 words a minute. Standard features are variable pitch, proportional spacing, bold and shadow print, auto load, a cut-sheet guide, and 132-column capability for spread-

sheets. Optional features include a tractor feed for continuous forms and an accessory kit for full Apple Macintosh compatibility. Spinwriter Elf 370 for the IBM PCjr, \$545. Model 360 with selectable interface for the Apple II family, IBM, DEC, Compaq, and Hewlett-Packard, \$595. *NEC Information Systems, 1414 Massachusetts Ave., Boxborough, MA 01719.* [INQUIRY 201]

EXPANSION BOARDS

Expanding the Mac: With Mac-Enhancer, users can connect their Macs to a wide range of IBM-compatible peripherals, including letter-quality printers and modems. Without affecting the two existing ports on the Apple Macintosh, Mac-Enhancer adds one parallel and two serial ports, all IBM compatible. In addition, it contains terminal-emulation software for communication with databases, mainframes, and other micros. Installation is simple and the hardware is accessed through the regular menu. All Macintosh features, such as icons, pull-down menus, and the mouse, are retained. For the Apple Macintosh with 128K bytes or 512K bytes, \$249. *Microsoft, POB 97200, Bellevue, WA 98009.* [INQUIRY 202]

Hi-res graphics: The Color 400 graphics board is compatible with all standard IBM graphics software and offers 640 by 400 resolution. In addition to high resolution, it also supports software written for 200-line graphics cards, doubling each scan line for a 400-line display. Scan rate is user-programmable from 25.5 to 31 KHz, assuring compatibility with newer high-resolution monitors. Two character sets in ROM are gener-

ated with 8 by 8 and 8 by 16 matrices. The Color 400 supports such packages as Lotus 1-2-3, Visicalc, and Supercalc. For the IBM PC, \$795. With PC Paintbrush and Mouse Systems mouse, \$895. *Sigma Designs, 2023 O'Toole Ave., San Jose, CA 95131.* [INQUIRY 203]

TELECOMMUNICATIONS

More modems: Three new 2400-baud modems from Microcom automatically retransmit lost or incorrect data, offering error-free communication over any telephone line. The Era 2 PC/2400 internal card for the IBM PC features menu-driven communications software with one-keystroke commands and unattended operation. The PC/2400 Stand-alone contains the same features in an external box with LED status indicators, the Era 2 software package, and an RS-232 cable. Mac-Modem 2400, another stand-alone unit, brings the same functions to the Macintosh. Era 2 PC/2400, \$799. PC 2400 Stand-alone and Mac-Modem 2400, \$899. *Microcom, 1400A Providence Highway, Norwood, MA 02062.* [INQUIRY 204]

Voice plus data: Ultralink integrates two important office tools: the computer and the telephone. The plug-in board replaces external modems and combines conversation with simultaneous data checking and review on a single telephone line. Screen views can be sent with a keystroke. The board has its own power supply and RAM and maintains a directory of 200 numbers. For the IBM PC, \$895. *Modern Technologies International, Suite 302, 656 Bair Island Rd., Redwood City, CA 94063.* [INQUIRY 205]

NEW PRODUCTS

JUNE 1985

MASS STORAGE

High-capacity Macstorage: The Bernoulli Box, now available for the Apple Macintosh, combines the access speed and high capacity of rigid files with the flexibility of floppies. Half-inch-thick cartridges, about 5 by 7 inches, hold 5 megabytes of formatted data and interchange from drive to drive. Average access speed is 50 milliseconds, rivaling Winchester drives, and a unique "soft interface" with circulating air eliminates dust contamination. Drive, \$1895; cartridges, \$59. Also available for IBM, Compaq, Columbia, Sperry, Corona, TI, and Zenith micros. *Iomega, 4646 South 1500 West, Ogden, UT 84403.* [INQUIRY 206]

Economical hard disk: The Slider, a 10-megabyte Winchester subsystem with storage equaling 54 single-sided floppies, is a likely candidate for most bytes per dollar. It supports the Apple family of operating systems, including Apple DOS, ProDOS, and CP/M. Average access time is 155 milliseconds. For Apple II Plus and IIe, \$695. *First Class Peripherals, POB 6187, Bethlehem, PA 18001.* [INQUIRY 207]

MISCELLANEOUS

Voice recognition: Lis'ner 1000 is a voice recognition and synthesizer board containing the General Instruments SP1000 LPC voice recognition chip. When it hears a word in its vocabulary, it sends a preprogrammed sequence of characters to the keyboard input handler as if it had been typed. For example, when you say "catalog," the disk directory appears on the screen, just as if you'd typed in the command. DOS words, keyboard commands, and numbers can be spoken instead of typed. The board analyzes voice input in real time, comparing what it "hears" with templates stored in memory. Its 64-word vocabulary, which can be changed, occupies 8K bytes. For the Apple II, \$189; Commodore 64, \$149. For the Apple II with optional computer speech output from precoded word dictionary,

\$259. *Micromint, 25 Terrace Dr., Vernon, CT 06066.* [INQUIRY 208]

Simple switching: Print Switch eliminates cable-swapping and bent pins. It links two printers to your micro; you can go from dot matrix to daisy wheel with the touch of a button. Switching is electronic rather than mechanical. Includes indicator LEDs for on-line printer, \$129. *Computer Source, 11041 North Port Washington Rd., Mequon, WI 53092.* [INQUIRY 209]

IIC on the go: A portable power briefcase with rechargeable battery offers up to 8 hours of continuous operation with the Apple IIc and flat-panel LCD screen. Designed to tuck under an airline seat, the soft case weighs 20 pounds with computer and battery inside and also holds disks and the Apple modem. Included are a detachable shoulder strap and removable plastic panels for a lap workstation. A low-battery beeper warns you to store material and recharge. After 8 hours of operation, charging time is 12 to 14 hours. For Apple IIc and flat-panel screen, \$269.95. *Prairie Power Systems, 15500 Wayzata Blvd., Wayzata, MN 55391.* [INQUIRY 210]

MONITORS

New Sony: The KV-1311CR doubles as a high-quality color receiver. The 13-inch color monitor comes with remote control to access 125 cable channels. Two audio/video inputs accommodate computers with composite video outputs, VCRs, videodisc players, and other components. A built-in RGB interface connects to the IBM PC and compatibles. A specially designed Trinitron tube supplies the resolution needed for computer graphics. Priced at \$595. *Sony Consumer Products, Sony Dr., Park Ridge, NJ 07656.* [INQUIRY 211]

High-resolution RGB: Two new monitors from Amdek offer vivid graphics. The Color 700 features 720 by 240 resolution and can be switched between the full 16 IBM or Apple colors. It displays up to 96 col-

umns and 25 lines of text; for easier reading, a switch changes text color from white to green. The Color 710 has 720 by 480 resolution and adds an etched CRT to reduce glare. A tilt/swivel base is available. For the IBM PC and Apple II family. Color 700, \$699; Color 710, \$799. *Amdek, 2201 Lively Blvd., Elk Grove Village, IL 60007.* [INQUIRY 212]

Software

GRAPHICS

Enhanced images: AT&T's state-of-the-art graphics package for the PC 6300 is equipped with video display or image capture boards, which produce high-quality pictures approaching continuous tone from a television or video camera. In addition to the standard features, the Paint and Image software offers real-time processing, including color manipulation, adding and eliminating elements, cropping, and combining pictures. It also will merge with the new Business Graphics Presentation software that uses data from popular spreadsheets. \$395 each. *AT&T Consumer Products, 5 Wood Hollow Rd., Parsippany, NJ 07054.*

Software only: Without additional hardware, Monografx creates charts, graphs, and illustrations for presentations and reports. Users can make, move, mix, and clip images within or between files. Nineteen file patterns are available, and text can be mixed with graphics. The program operates with the IBM graphics printer; Epson FX and MX with Grafrax; C. Itoh Prowriter, and Okidata 84, 92, and 93 with Plug 'n Play chips. For the IBM PC and compatibles, \$49.95. *Analytics International, 17 Oakland Ave., Arlington, MA 02174.*

3-D graphics: With 3-D World 64, you can create complex three-dimensional graphics on-screen, then print them on the Commodore 1520. Objects defined with points and line segments can be rotated and scaled. The menu-driven program requires no additional hardware. For the Commodore 64, \$39.95.

Graph-Tech Software, 1315 Third Ave. No. 4C, New York, NY 10021.

Automatic organizational charts:

DGI Organization, menu-driven for easy use, quickly creates and updates organization charts for up to 50 persons, including titles and footnotes. For Apple II Plus and IIe; IBM PC and PCjr, \$175. *Decision Graphics, POB 2776, Littleton, CO 80161.*

DATABASES/SPREADSHEETS

Personnel files: Human Resource Management delivers information on employee history, salary, benefits, performance, skills, and education, and also furnishes reports and expense summaries on insurance, profit-sharing and pension plans. It tracks information needed for government reports and generates them in the proper formats. For the IBM PC, \$695. *Open Systems, 430 Oak Grove, Minneapolis, MN 55403.*

Agricultural data: Crop and Livestock Accounting for farmers and ranchers includes financial reporting, check writing, and inventory management. It generates reports for specific portions of the total operation, such as cattle or wheat, and will handle partnerships and multiple farms and ranches. Included is a Schedule F worksheet for preparing income tax. For the IBM PC and Tandy 2000, \$995. *Great Plains Software, 1701 SW 38th St., Fargo, ND 58103.*

Accounting: The Business Accountant, for small- to medium-sized businesses, includes a general ledger, accounts payable and receivable, inventory control, and payroll. Elements can be used individually, depending on need, or integrated with a system manager for a complete business package. Features include a security system, mailing and label lists, and ability to print any screen. The total system generates more than 100 different reports. For the Apple IIc and IIe. System Manager, \$95; general ledger, accounts payable, accounts

receivable, and inventory control, \$295 each. Payroll systems, \$345. *Manzanita Software Systems, Suite 200-A, One Sierra Gate Plaza, Roseville, CA 95678.*

**WORD PROCESSING/
TELECOMMUNICATIONS**

Seeking synonyms: Finding the right word is easy with Synonym Finder, a thesaurus for Wordstar and Multimate. More than 9000 key words call up an average of 10 synonyms, with some yielding more than 50. You simply position the cursor and enter a two-stroke command, and the synonyms appear in a window. The selected word deletes and replaces the old. For MS-DOS, PC-DOS, and CP/M-80 versions of Wordstar 3.0 through 3.3 and MS-DOS and PC-DOS versions of Multimate, \$124.95. Versions for other popular word-processing programs are expected in the near future. *Writing Consultants, 11 Creek Bend Dr., Fairport, NY 14450.*

MacSpelling: Hayden:Speller checks documents with a dictionary containing 97 percent of the most frequently used English words. You also can add special lexicons based on individual needs. The Speller checks words one at a time or scans the full manuscript, and accommodates such Macintosh features as pull-down menus and overlapping windows. A "lookup" command lists words with similar spelling when the writer is not sure how to correct a word. The program is compatible with MacWrite and Microsoft Word; \$79.95. *Hayden Software, 600 Suffolk St., Lowell, MA 01854.*

PROGRAMMING/UTILITIES

Cross-brand compatibility: Media Master, a disk-to-disk format conversion, makes the IBM PC compatible with files from more than 70 microcomputers. Users have access to a multitude of data from "foreign" CPM and MS-DOS computers, with read, write, and formatting capabilities. For the IBM PC and XT, \$39.95. Also available for the DEC

Rainbow 100, Kaypro II/2, and Osborne 1, Executive, and Vixen. *MDG & Associates, 4573 Heatherglen Ct., Moorpark, CA 93021.*

COBOL for micros: Microsoft COBOL, version 2.0, brings mainframe capabilities to microcomputers. Less expensive micros can be used to develop COBOL mainframe applications; by the same token, mainframe programs can be moved to micros, resulting in consistency, flexibility, and cost savings. Special features include four types of files, advanced screen interaction, file-sharing capability, built-in sort/merge, and interactive symbolic debugging. Minimum requirements are 192K bytes of RAM, two disk drives, and MS-DOS version 2.0; \$700. *Microsoft, POB 97200, Bellevue, WA 98009.*

EDUCATIONAL/PERSONAL

Solar design: Energy-efficient structures are the goal of Passive Solar Design, an interactive software package for architects, engineers, contractors, and educators. It quickly makes complicated solar design calculations for new and existing buildings, incorporating methodology from the Los Alamos Scientific Laboratories. Includes solar-radiation data for 219 U. S. and Canadian cities. For the IBM PC and TRS-80, \$395. *John Wiley & Sons, 605 Third Ave., New York, NY 10158.*

Home alarm: Apple Alarm converts your computer into a sentry to protect your home from intrusion, fire, smoke, and moisture. No special equipment is required; the package comes with a manual of suggested applications and information on inexpensive switches and sensors. For the Apple II and IIe, \$20. *Andent, Inc., 1000 North Ave., Waukegan, IL 60085.*

New Products provides up-to-date information on recent releases of microcomputer hardware, software, and accessories. Descriptions are based on information supplied by the manufacturers and should not be considered endorsements. If you need additional information, please check your local dealers or write directly to the manufacturers.

Precision Data Products
Complete Line of Quality Supplies for Your Computer

TOLL FREE ORDER LINE
800-258-0028
FOR INFORMATION CALL
616-452-3457

MasterCard C.O.D. VISA

FREE FLIP'N'FILE™/15

Prepacked With 10 3M 5¼" Diskettes at Precision Data's Low Prices

SSDDRH \$1.54 Each
DSDDRH \$2.04 Each

ORDER NOW — LIMITED TIME OFFER

Introducing Flip'N'File™/15 with 50% more storage capacity than the standard library case. Secure, dust-free protection for 15 5¼" Diskettes. Ideal for most workstations.

— CALL FOR IMMEDIATE SHIPMENT —

Add 10% for quantities less than 100.
Shipping and Handling \$5.00 per 50 diskettes.
C.O.D. add \$2.00 MI residents add 4% sales tax.

Precision Data Products
P.O. Box 8367, Grand Rapids, MI 49508
(616) 452-3457 • Michigan 1-800-632-2468
Outside Michigan 1-800-258-0028




INSTANT FINANCIAL PICTURE!

Corporate Financial Simulation Model on your IBM PC, XT or AT with Lotus 1-2-3, Multiplan, SuperCalc, VisiCalc or PeachCalc. Also available on most PC/M & all Apple systems. A \$6,000 value for \$295.



Bottomline V

A Financial Decision Support System - budgeting, planning, analysis, and five-year forecasting. Now used nationwide by Peat, Marwick, Mitchell & Co. ("Big 8" accounting firm).

Fill out this card and mail for complete details, or call 1-800-828-7257, CA only 1-800-523-7201, or 714-476-2842 for UPS COD delivery.

- ☐ Send more information
- ☐ My check for \$10 is enclosed. Please send me a (circle one) black and white/color Demo for my IBM PC.
- ☐ Please send me Bottomline V for _____ Spreadsheet on the _____ computer. My check for \$295 plus \$5 for shipping and handling is enclosed.

Name _____ Title _____
Company _____ Phone _____
Street _____
City _____ State _____ Zip _____

Mail to: ILAR Systems, Inc.

• 1300 Dove St., Suite 105 • Newport Beach, CA 92660

SPECIAL REPORT PORTABLE DISPLAYS

Continued from page 75—

this development is generally thought to be a few years off.

A new product just announced by Telefunken of West Germany illustrates the possibilities of LED technology. Telefunken uses a high-density matrix of LEDs to activate a light-sensitive drum in a system not unlike that of a copier. The LEDs drive a sophisticated new printer system designed to compete with laser printers. Having achieved a density of 300 pixels to the inch—more than 35 times higher resolution than is possible with conventional LEDs—the new LED array is a solid indicator of the potential this technology holds for future display applications.

LCDs

Liquid crystal displays are the best-known portable-computer display technology, used in such computers as the Radio Shack Models 100 and 200, the flat-screen Apple IIc, the Data General One, and the new MS-DOS-compatible computer from Quadram.

LCDs operate like a set of tiny venetian blinds. The crystals lie over an underlying surface and, when activated by a small voltage, rotate to reveal the surface underneath. In conventional LCD panels, the crystals' surface is somewhat reflective; when the crystals rotate, they reveal an underlying dark, light-absorbing material.

A new LCD technology, called guest-host display (GHD), uses a special "dichroic" dye to color the liquid crystals. The dye molecules are long and thin and lie parallel with, or atop, those of the liquid crystals. When the crystals are parallel to the viewing surface, the color appears, but when the crystals are rotated, the color disappears.

Two types of GHD LCDs are currently available. The first, called the Heilmeter type, uses a polarizer and is bright in the transmissive mode, while the other type, the White and Taylor system, doesn't use a polarizer and is bright in the reflective mode. Using these technologies, relatively high-contrast multicolor LCD displays are possible.

Citizen, Sharp, Toshiba, Seiko, Epson, and Hosiden Electronics (all of Japan) have released variations on these systems for three-dye full-color LCDs, with the largest being a 7-inch diagonal display from Hosiden that has a resolution of 325 by 325 pixels. Epson has shown a 4¼-inch display with 480 by 480 resolution, in addition to releasing a new 2-inch LCD color TV, the Epson Elf, to the American market.

Such small high-resolution LCD displays owe their existence to a new technology whereby semiconductors, including transistors and diodes, are mounted directly on the glass substrate that underlies the LCD display. Integrating the electronics into the display this way makes possible much more densely packed dots and greater numbers of dots per display, with fewer connecting wires and peripheral control circuitry. For example, Seiko's new color LCD TV has a 52,800-dot color screen,

with each dot powered by its own substrate-mounted transistor.

This technique is called "thin-film" application of "active" elements (transistors and diodes) and, according to Susumu Aizawa, senior managing director of Epson Corporation, it could lead to flat-panel portable displays with a resolution of 1000 by 1000 pixels (a million pixels!) by the end of the decade or before. This resolution is about four times that of today's full-sized, desktop CRTs.

For the moment, though, such high-resolution displays will probably be limited to very small screen applications, such as Seiko's new LCD color TV. The reason is that thin-film manufacturing technology is the same as that used to produce the current generation of VLSI (very-large-scale integration) IC chips; they're manufactured on individual wafers, and difficult manufacturing obstacles currently limit the maximum wafer diameter to about 6 inches.

Even though extremely-high-resolution megadot LCD displays may still be a few years off, guest-host technology may provide a near-term solution to the contrast problems that have plagued display-screen manufacturers.

Some manufacturers are also experimenting with active light transmissive systems, where low-reflectivity LCD crystals are rotated to allow a source of backlighting to pass through the display to the viewer, producing an active, rather than passive, display. While the backlighting would increase the power consumption of the display, it would also increase visibility in certain situations.

What's Ahead

LCD displays use the smallest amount of power of all technologies currently available; they also suffer from problems of poor contrast and a limited range of temperatures and lighting conditions over which they can work.

CRTs use more power but produce a more highly visible display and are easily capable of high resolution. They also are going through an interesting series of sophisticated transformations via the new flat CRT technology that reduces installation depth to about an eighth, which may make them a solid contender in portable displays.

GPDs appear to have a solid future in the desktop market, although Grid's experience indicates that the new ELDs are creeping up fast and will probably have an edge with the portables. And the dark horse, at the moment, is LEDs. While some in the industry are predicting "LED chips" and large-scale LED displays in the next year or two, many are still skeptical.

Whichever of these new technologies emerges as the winner in the portable market—and it may be a mixture or hybrid of several—the result is easily predictable right now: in the near future, portable computers will have more visible, more legible, higher-resolution, and less expensive displays. □

100% GUARANTEE

Undeniable.

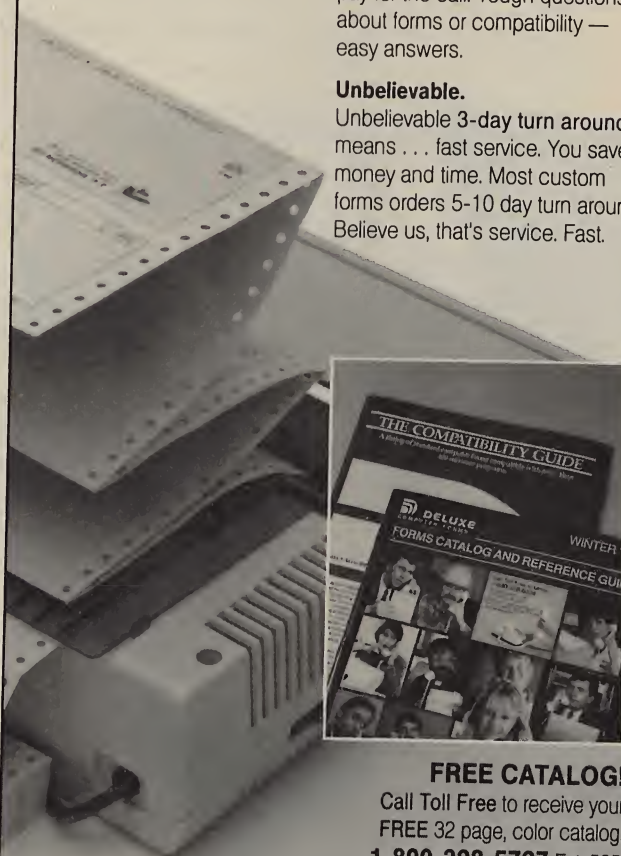
Deluxe Computer Forms means undeniable quality. Your order must match your requirements — or you won't pay! That's quality, undeniably. Guaranteed.

Unquestionable.

Our unquestionable guarantee means the forms you select are 100% compatible with your software. Forms Consultants can answer your questions and we'll pay for the call. Tough questions about forms or compatibility — easy answers.

Unbelievable.

Unbelievable 3-day turn around means . . . fast service. You save money and time. Most custom forms orders 5-10 day turn around. Believe us, that's service. Fast.



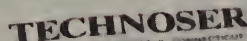
FREE CATALOG!

Call Toll Free to receive your
FREE 32 page, color catalog.
1-800-328-5727 Ext. 525
In Minnesota 1-800-742-5685

 **DELUXE**
COMPUTER FORMS

A DIVISION OF DELUXE CHECK PRINTERS, INC.

7088



Page 41 of 41

[illegible]

1. I would like to know if you have any information on the following:
a. The name of the person who was the first to be arrested in the case.
b. The name of the person who was the last to be arrested in the case.
c. The name of the person who was the first to be released in the case.
d. The name of the person who was the last to be released in the case.
e. The name of the person who was the first to be charged in the case.
f. The name of the person who was the last to be charged in the case.
g. The name of the person who was the first to be sentenced in the case.
h. The name of the person who was the last to be sentenced in the case.
i. The name of the person who was the first to be released on parole in the case.
j. The name of the person who was the last to be released on parole in the case.
k. The name of the person who was the first to be released on probation in the case.
l. The name of the person who was the last to be released on probation in the case.
m. The name of the person who was the first to be released on conditional release in the case.
n. The name of the person who was the last to be released on conditional release in the case.
o. The name of the person who was the first to be released on full parole in the case.
p. The name of the person who was the last to be released on full parole in the case.
q. The name of the person who was the first to be released on full conditional release in the case.
r. The name of the person who was the last to be released on full conditional release in the case.
s. The name of the person who was the first to be released on full probation in the case.
t. The name of the person who was the last to be released on full probation in the case.
u. The name of the person who was the first to be released on full conditional release in the case.
v. The name of the person who was the last to be released on full conditional release in the case.
w. The name of the person who was the first to be released on full probation in the case.
x. The name of the person who was the last to be released on full probation in the case.
y. The name of the person who was the first to be released on full conditional release in the case.
z. The name of the person who was the last to be released on full conditional release in the case.

117-118

4th & 5th Avenue, New York



1994年12月15日

I would like to share an experience with you, regarding that night of "Spring 1967" (as we call it in our circles). I had a very special time that night and I am happy to share it with you. I had a very special time that night and I am happy to share it with you. I had a very special time that night and I am happy to share it with you.

1. The first part of the document is a letter from the author to the reader, dated 1940. It discusses the author's work on the history of the United States and the author's views on the country's future.

Thank you for your letter.

4226 M. L. M. L.

1994-1995
1996-1997

31 Ave. St.
Plymouth, Mo
December 1911.

Posters, Computers, Computing
PLAB 907
March 14, 1990
Door 511

Dear Sir,

Place - 1
Company - 1

[illegible]

by the way try the great new
the \$10,000 or so price under one month
and, and is now friendly to deal
your self to play with.

Respectfully yours,
[Signature]

APR 1988

May 20 1941

Mr. Thomas Mendenhall
c/o Popular Engineering
Co. Main Street
Pittsburg, VA 24380
Re: [illegible]

34

[illegible]

to your article in Software for the Week
which apparently is of the would provide me with a
and useful means keeping for a permanent listing in
I hope you can assist me in the right direction in writing the
memoir as to what is available in this area.

THE POPULAR DIFFERENCE: Reader Involvement

Popular Computing is the interactive medium in print.

Our readers actually help shape the magazine every month because they are computer owners and users, and because sharing information is what computers are all about.

They send us hundreds of article suggestions. Excellent ideas, and the real problem is choosing which ones not to use.

They user-test hardware and software in the real world of their offices and homes, and write many of our reviews. That's why Popular reviews have the tang and bite of reality rather than an ivory tower detachment or the bland excitement of a press release.

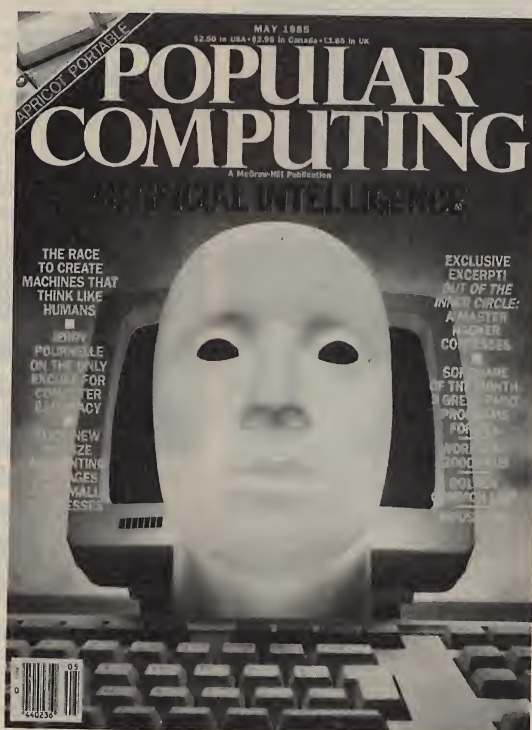
When our columnists ask for comment, our readers write lengthy single-spaced letters; lots of them.

They seek out our editors at conventions, call them at home on weekends, even visit our editorial offices.

They're the most exciting magazine audience in America; busy, intelligent people discovering how computers can enhance their lives, and using Popular Computing to help them use their computers.

If you'd like to know more about them, and about Popular Computing, our new Subscriber and Pass-Along Profiles—professional, full-disclosure research—are yours for the asking.

Call Bill Boyle, Director of Marketing & Sales, 603/924-9281, today. Because the more you ask, and the more you know, the more Popular your media decision.



70 Main Street, Peterborough, New Hampshire 03458

Now, the lowest prices ever on

3M Scotch® DISKETTES

LIFETIME WARRANTY!

\$149 ea.

5 1/4" SSDD

Qty. 50

\$199 ea.

5 1/4" DSDD

Qty. 50

5 1/4" SSDD-96TPI → **\$2.29** ea. 5 1/4" DSDD-96TPI → **\$2.85** ea.

SOFT SECTOR ONLY! MINIMUM ORDER: 20 DISKETTES

ADD 3% FOR ORDERS UNDER 50! **FREE!** FLIP 'N FILE 15 w/10 DISKETTES. (Eff. Thru 5/30/85)

These are factory-fresh 3M diskettes packed in boxes of 10 with Tyvek sleeves, reinforced hubs, identification labels and write-protect tabs.

3.5" MICRO-DISKETTES—SS-135 TPI → \$2.89 ea.

LIFETIME WARRANTY ON ALL 3M SCOTCH DISKETTES!

HOURS: 8AM-5PM Central Time, Monday-Friday

WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD!, Inc.

Suite 4806 • 30 East Huron Street • Chicago, Illinois 60611

DISK WORLD! Authorized Distributor Information Processing Products **3M**

FANTASTIC LOW PRICES ON BASF QUALIMETRIC DISKETTES!

LIFETIME WARRANTY!

\$129 ea.

5 1/4" SSDD

Qty. 20

\$149 ea.

5 1/4" DSDD

Qty. 20

5 1/4" SSDD-96TPI → **\$1.46** ea. 5 1/4" DSDD-96TPI → **\$1.75** ea.

PACKED IN CARDBOARD CASES!

BASF QUALIMETRIC DISKETTES have a LIFETIME WARRANTY with Tyvek sleeves, reinforced hubs, user identification labels and write-protect tabs.

SOFT SECTOR ONLY! MINIMUM ORDER: 20 DISKETTES

BASF 3.5" MICRO-FLOPPIES BASF 5 1/4" HIGH DENSITY FOR IBM PC-AT

SSDD-135 TPI → **\$2.50** ea. DSDD-HD → **\$4.91** ea.

FOR ORDERS ONLY: 1-800-621-6827 **INFORMATION & INQUIRIES: 1-312-944-2788**

(In Illinois: 1-312-944-2788)

HOURS: 8AM-5PM Central Time, Monday-Friday

WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD!, Inc.

Suite 4806 • 30 East Huron Street • Chicago, Illinois 60611

DISK WORLD! Authorized Reseller Information Processing Media **BASF**

Incredible value! Nashua Diskettes

LIFETIME WARRANTY!

\$105 ea.

5 1/4" SSDD

Qty. 50

\$115 ea.

5 1/4" DSDD

Qty. 50

These are poly-bagged diskettes packaged with Tyvek sleeves, reinforced hubs, user identification labels and write-protect tabs. NASHUA Corporation is a half-billion dollar corporation and a recognized leader in magnetic media.

SOFT SECTOR ONLY! Sold in multiples of 50 only!

FOR ORDERS ONLY: 1-800-621-6827 **INFORMATION & INQUIRIES: 1-312-944-2788**

(In Illinois: 1-312-944-2788)

HOURS: 8AM-5PM Central Time, Monday-Friday

WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD!, Inc.

Suite 4806 • 30 East Huron Street • Chicago, Illinois 60611

DISK WORLD! Authorized Distributor **NASHUA MAGNETIC MEDIA**

BETTER MODEMS AT LOWER PRICES!

...and get 24-hour shipping on your DISK WORLD! orders

1200/300 Baud Avatex Modem

\$189.95 ea.

300 Baud Avatex Modem

\$59.95 ea.

Avatex Modems have everything. They're inexpensive, Hayes-compatible, Auto Dial, Auto Answer and high quality (backed by a one-year warranty).

Best of all, our combination includes a One-Year FREE subscription to MCI MAIL and special communications software for placing TOLL-FREE orders with DISK WORLD!

Orders received via MCI MAIL are shipped within 24-hours (subject to product availability). (Cables are not included.)

FOR ORDERS ONLY: 1-800-621-6827 **INFORMATION & INQUIRIES: 1-312-944-2788**

(In Illinois: 1-312-944-2788)

HOURS: 8AM-5PM Central Time, Monday-Friday

WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD!, Inc.

Suite 4806 • 30 East Huron Street • Chicago, Illinois 60611

DISK WORLD! Authorized Distributor **AVATEX MODEMS**

DISK WORLD! Ordering & Shipping Instructions

Shipping: 5 1/4" & 3.5" DISKETTES—Add \$3.00 per each 100 or fewer diskettes. Other items: Add shipping charges as shown in addition to other shipping charges. Payment: VISA and MASTER-CARD accepted. COD Orders: Add additional \$3.00 Special Handling charge. APO, FPO, AK, HI & PR Orders: Include shipping charges as shown and additional 5% of total order amount to cover PAL and insurance. Taxes: Illinois residents only, add 8% sales tax.

Prices subject to change without notice. This ad supercedes all other ads. Not responsible for typographical errors. MINIMUM TOTAL ORDER: \$35.00

FOR ORDERS ONLY: 1-800-621-6827 **INFORMATION & INQUIRIES: 1-312-944-2788**

(In Illinois: 1-312-944-2788)

HOURS: 8AM-5PM Central Time Monday-Friday

WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD!, Inc.

Suite 4806 • 30 East Huron Street • Chicago, Illinois 60611

DISK WORLD!

ATHANA DISKETTES The great unknown!

99¢ ea.

5 1/4" SSDD

Qty. 50

\$109 ea.

5 1/4" DSDD

Qty. 50

You've used these diskettes hundreds of times...as copy-protected originals on some of the most popular software packages. They're packed in poly-bags of 25 with Tyvek sleeves, reinforced hubs, user identification labels and write-protect tabs.

LIFETIME WARRANTY!

SOFT SECTOR ONLY! Sold in multiples of 50 only.

FOR ORDERS ONLY: 1-800-621-6827 **INFORMATION & INQUIRIES: 1-312-944-2788**

(In Illinois: 1-312-944-2788)

HOURS: 8AM-5PM Central Time, Monday-Friday

WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD!, Inc.

Suite 4806 • 30 East Huron Street • Chicago, Illinois 60611

DISK WORLD! Authorized Distributor **ATHANA MAGNETIC MEDIA**

DISKETTE STORAGE CASES

AMARAY MEDIA-MATE 50: A REVOLUTION IN DISKETTE STORAGE

Every once in a while, someone takes the simple and makes it elegant! This unit holds 50 5 1/4" diskettes, has grooves for easy stacking, inside nipples to keep diskettes from slipping and several other features. We like it!

\$10.95 ea. + \$2.00 Shpg.

DISKETTE 70 STORAGE: STILL A GREAT BUY.

Dust-free storage for 70 5 1/4" diskettes. Six dividers included. An excellent value.

\$11.95 ea. + \$3.00 Shpg.

DISK CADDIES

The original flip-up holder for 10 5 1/4" diskettes. Beige or grey only.

\$1.65 ea. + 20¢ Shpg.

FOR ORDERS ONLY: 1-800-621-6827 **INFORMATION & INQUIRIES: 1-312-944-2788**

(In Illinois: 1-312-944-2788)

HOURS: 8AM-5PM Central Time, Monday-Friday

WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD!, Inc.

Suite 4806 • 30 East Huron Street • Chicago, Illinois 60611

DISK WORLD! The value leader in Computer supplies And accessories.

PRINTER RIBBONS: at extraordinary prices!

Brand new ribbons, manufactured to Original Equipment Manufacturer's specifications, in housings. (Not re-linked or spools only.)

LIFETIME WARRANTY!

Epson MX-70/80 . . . **\$3.58** ea. + 25¢ Shpg.
Epson MX-100 . . . **\$4.95** ea. + 25¢ Shpg.
Okidata Micro83 . . . **\$1.48** ea. + 25¢ Shpg.
Okidata Micro84 . . . **\$3.66** ea. + 25¢ Shpg.

FOR ORDERS ONLY: 1-800-621-6827 **INFORMATION & INQUIRIES: 1-312-944-2788**

(In Illinois: 1-312-944-2788)

HOURS: 8AM-5PM Central Time, Monday-Friday

WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD!, Inc.

Suite 4806 • 30 East Huron Street • Chicago, Illinois 60611

DISK WORLD!

Nail down great prices on MEMOREX diskettes!

LIFETIME WARRANTY!

\$128 ea.

5 1/4" SSDD

Qty. 20

\$170 ea.

5 1/4" DSDD

Qty. 20

MEMOREX DISKETTES come with heavy, lintless paper sleeves, reinforced hubs, write-protect tabs and user ID labels.

3.5" MICRO-FLOPPIES SSDD-135TPI \$2.44 ea. **SOFT SECTOR ONLY! MINIMUM ORDER: 20 DISKETTES** 5 1/4" DSDD-HD FOR IBM PC-AT \$3.89 ea.

INFORMATION & INQUIRIES: 1-312-944-2788

HOURS: 8AM-5PM Central Time Monday-Friday

WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD!, Inc.

Suite 4806 • 30 East Huron Street • Chicago, Illinois 60611

DISK WORLD!

AT RISK: ON-LINE FREEDOM

Continued from page 77—

tions Commission on telecommunications policy, urging guarantees of privacy in electronic communications and arguing against restrictive regulations like licensing (as with amateur radio) or surcharges. Phillips thinks Congress should act to close the loophole and specify that data communications should enjoy the same privacy as voice does, because it's simply a different form of communication. But, he notes, Congress generally waits to act until enough constituents speak up about a problem. And so far, he says, not enough people have thought privacy in telecommunications important enough to raise a fuss—until very recently.

Raising a Fuss

The private nature of electronic mail was called into question on Compuserve last October when Jules Millman, a representative of a competing telecommunications network, sent out some 5000 messages advertising his new company via Compuserve's electronic-mail system. Millman ended some of the messages with the phrase "Thank you for using Compuserve," and Compuserve executives somehow learned of it. Within a week, David C. Swaddling, a Compuserve vice president, wrote Millman a letter demanding that he cease and desist using the company's name in his offer. Swaddling also stated that Compuserve had "removed, therefore, such offending messages as we have identified them."

Compuserve officials now say that no E-Mail was actually deleted and that their policy is to remove only offensive material from public-message areas: bulletin boards and special-interest groups with unrestricted access. But after receiving Compuserve's letter, Millman assumed that Compuserve had indeed deleted messages that he sent over the private electronic-mail system. The incident became a cause célèbre on the electronic networks, where sentiment naturally ran strongly in favor of maintaining the privacy of electronic mail.

Jonathan Wallace, a Manhattan attorney whose practice involves data processing and software licensing, is an active subscriber to Compuserve. "Electronic mail of all sorts—MCI Mail, Compuserve, private bulletin boards—has replaced the U.S. mail to an astonishing amount in my own and others' daily business. If that's the case and if in five to ten years we're all going to send more electronic messages than U.S. mail, obviously the same guarantees of privacy are going to have to apply."

Wallace says, "The U.S. Postal Service's failed attempt at electronic mail [called E-COM] would probably have been subject to the same rules of privacy that surface mail is subject to." That's because the Postal Service is a common carrier, providing a basic, interstate service deemed necessary to the public and regulated by various governmental agencies.

In the communications field, common carriers are required to apply for a license from the FCC and are subject to certain regulations. They must provide service to any individual or company that requests it, adhere to rates approved by the FCC, respect the privacy of the messages they transmit, and abide by other regulations.

The communications lines that Compuserve, The Source, and MCI use to transmit messages are governed by FCC regulations. The services these private companies provide, however, are considered enhanced but not basic services. These are not governed by the FCC and are not subject to its regulations concerning privacy and other issues.

Under current legislation, Wallace maintains, Compuserve is legally entitled to delete private mail or do anything it wants without facing criminal charges. At most, the company would be guilty of breaching its subscriber agreement, which could warrant a civil action for breach of contract. Since the time of the Millman controversy, however, Compuserve has stated that it will respect the privacy of electronic mail, even though it is not bound to do so by FCC regulations.

Establishing Policies

Wallace is also a charter member of Computer Hobbyists Against Raiders and Thieves (CHART), a group that meets on Compuserve to discuss how to maintain freedom of electronic communication in an environment where unscrupulous people may take advantage of the freedom.

"I would like to see as little legislation as possible," Wallace says, "but that depends on people regulating themselves. Legislation will be pushed and passed to address these issues if the various electronic-mail companies don't address it themselves first. If they each proclaim it their policy, as Compuserve has, never to invade the privacy of electronic mail, then government will not see a need to act so quickly. I think the networks will see that maintaining private areas inviolate is in their best interests."

The Source also respects the privacy of electronic mail and makes its policy clear in the subscriber agreement. However, the agreement further states that Source Telecomputing Corporation (STC) "may review any material stored in files or programs to which all subscribers have access . . . and will remove any material which STC in its sole discretion believes to be unlawful or otherwise objectionable . . . without notice . . ."

Accordingly, when a Participate (STC's teleconferencing system) user's story about a vacation got a little steamy, STC deleted it. Although Participate (PARTI) is a public conference, rather than a private message area, the censorship nevertheless angered many users. "I don't want anyone deciding for me what's offensive and what isn't," wrote one PARTI subscriber. Responding to subscribers' objections, STC has since said publicly that it will not delete material in PARTI conferences.

Another Source subscriber, David Hughes—Sourcevoid Dave, as he's known to his friends on the networks—is an eloquent voice for free speech in telecommunications. Hughes is the system operator, or sysop, of an immensely popular

AT RISK: ON-LINE FREEDOM

bulletin board, The Old Colorado City Electronic Cottage in Colorado Springs, which has logged tens of thousands of messages over the last three years.

"With the uneasiness and ambivalence Americans have about computers in general and 'intrusion' by computers in particular," Hughes warns, "I think you have all the ingredients for a real battle of 'electronic freedom of speech' versus 'control of telecommunications.'"

Hughes has fought in some of the skirmishes himself. When Colorado Springs' City Council was planning to tighten the city's work-at-home ordinance, he argued that people employed in high-tech occupations would suffer. He put the text of the proposed ordinance on his BBS, which turned into a public forum to reshape the ordinance. At the next meeting of the City Council, 175 people showed up; eventually, a version emerged that was acceptable to the telecomputing public. And last year, during the breakup of AT&T, when Mountain Bell in Oklahoma proposed a \$40 monthly surcharge for modem users, Hughes appeared before the Public Utility Commission and made the case for individual telecommunications. The surcharge was defeated.

Hughes sees telecommunications as an integral part of the political process. And he acknowledges that "electronic democracy is bound to be boisterous and untidy and attract common crooks in its exciting infancy." But Hughes feels strongly that invasion of private mail and censorship of material violates the right to free speech guaranteed by the First Amendment. Like other proponents of telecommunications, he is determined to fight any further threats to free speech on telecommunications networks.

The Question of Liability

Last May, another skirmish began in Los Angeles when police confiscated a sysop's equipment with the help of representatives of Pacific Telephone and Telegraph. PacTel's investigators had logged on to Mog-Ur—a free bulletin board that video

engineer Tom Teimpidis operated from his home in Granada Hills—and had found an illegal PacTel credit-card number and a Sprint access code posted in a conference named Underground.

Los Angeles City Attorney Ira Reiner eventually pressed charges for credit-card fraud, a misdemeanor under California law punishable by up to a year in prison and a \$10,000 fine.

Teimpidis's attorney, Chuck Lindner, first heard about the case on CompuServe. When Teimpidis contacted him, Lindner agreed to take the case without fee. Lindner thinks that PacTel influenced the City Attorney's office to prosecute Teimpidis, who disclaims any knowledge of the offending messages.

"There were 800 to 1000 active messages on the board," says Lindner. "PacTel found two access codes and they're calling it a pirate board! I think PacTel wants to strike fear in the heart of every modem user in the country. They want control of modem communications so they can make a profit from it . . . They're angling for things like surcharges for modem use . . ." The power to impose surcharges, Lindner maintains, means the power to limit access to this mode of communications, which means the power to suppress speech.

The central issue raised in the Teimpidis case is whether a sysop is liable for messages posted on a bulletin board system with or without the sysop's knowledge. In other words, if a sysop's board contains information helpful to a criminal, should the sysop be treated as an accessory before, during, and after the fact? Many lawyers who hold that the sysop is not liable suggest the analogy of the local supermarket bulletin board: if someone posts the combination to the bank's safe on the bulletin board, no reasonable policeman would hold the supermarket responsible.

A secondary issue is whether a sysop should be required to police the system and delete offensive messages. In the Teimpidis case, the board is stored on a 19-megabyte hard disk with several thousand

messages—a size that would require a substantial amount of time to monitor.

Lindner had planned to challenge the constitutionality of the statute under which Teimpidis was charged. "The statute makes a culprit of anyone who 'has reason to believe' credit-card numbers will be used in the commission of a crime," he says. "It's too broad. There's not another piece of legislation I know of that has such vague language in it. We had lawyers arguing all over CompuServe trying to figure out what the statute meant, and none of them could agree."

Questions Still Pending

In February, the Los Angeles City Attorney's office decided it had insufficient evidence to continue the prosecution and dismissed the case "in the interests of justice." Under California law, such a dismissal is "with prejudice" and the case cannot be refiled subsequently.

Chuck Lindner was very pleased with the dismissal. "I consider this to be a major victory for the rights of free speech . . . It shows that Pacific Telephone never did have a case, which is what I've been saying all along." Lindner also thinks that the dismissal is very meaningful because "it serves as a precedent, so if a stray credit card number ends up on a sysop's bulletin board, Pacific Telephone is back in the same place they were before: they have to prove a pattern, rather than a single instance."

While the outcome of this case is encouraging, it has still not resolved the central issue of who is liable for illegal material on BBSes. Another issue that remains untested is the right of authorities to seize equipment when illegal activity is suspected, which, some critics maintain, violates the constitutional guarantee of freedom of speech. These questions will remain unanswered until other cases are brought to trial or unless Teimpidis pursues a counter-complaint that the seizure of his equipment was unconstitutional.

Despite the fact that the case was dismissed, many bulletin board op-

AT RISK: ON-LINE FREEDOM

erators think that it has drastically changed the climate surrounding the operation of bulletin boards. Chicago attorney Paul Bernstein runs a BBS for lawyers, LAWMUG, and is now very careful about what stays on his board. During the period when the Teimpidis case was pending, he found that many sysops were shutting down their boards or requiring registration. On his own BBS, Bernstein admitted that he was becoming a censor himself.

Morgan Chu, a Los Angeles attorney who specializes in computer law, brings up a second consideration. He thinks that if sysops were obligated to make sure that nothing illegal is ever posted on a bulletin board, the task would be so burdensome that far fewer BBSes would be run.

Taking a Stand

The Teimpidis case touched off a nationwide debate among lawyers, bulletin-board operators, and others concerned about regulation of telecommunications. On one side are those who advocate stringent laws preventing fraudulent use of the technology. On the other side are those who argue for the protection of individual liberties.

Mike Cane, author of *The Computer Phone Book*, which lists and evaluates many of the BBSes in North America, comes down on the side of individual liberties while recognizing the need to curtail fraudulent use. Cane objects to the way in which the Teimpidis case was handled. "I have no objection to PacTel combatting fraud—all businesses have the right to protect their property," he says. "I object to the invasive means they utilize and their utter ignorance and insensitivity in discharging their obligations as a public utility."

The difficult task that remains is to protect the rights of all parties and educate those involved about their rights. Paul Bernstein thinks that BBSes are a powerful medium for distributing legal services and advice to a community of people who otherwise might not be able to afford it. And he would like to use the technology itself to deal with the

issues. Bernstein says, "I'd like to see government and the people involved set up some kind of communication—maybe a BBS—and start a dialogue to find a solution to this, short of Gestapo tactics."

Consequently, Bernstein and other sysops in the Chicago area have formed the National Association of Bulletin Board System Operators (NABBSO) to "protect the public and our constitutional rights of free speech and the free expression of ideas."

Ken Phillips, of the Committee of Corporate Telecommunications Users, thinks the question of electronic free speech was brought to a head with the Teimpidis case. He'd like to see a set of guidelines established "so those persons who choose to offer these facilities can do so without fear that they're going to be whisked away for events that they neither promote nor encourage, or in many instances don't have any knowledge of. At the same time, they need to feel that their privacy is secure."

Phillips urges all who use telecommunications services to voice their opinions. "Those who keep quiet will be kept quiet," he maintains. "Communications technology has become so complex and has such a short half-life that regulators, legislators, and lawyers rarely have a more than skin-deep understanding of what it is that they are regulating." He encourages users of bulletin boards and other telecommunications systems to write to their representatives in Washington, opposing all attempts to regulate communications.

According to Morgan Chu, "Traditional legal principles of privacy and free speech, with some modification or qualification because of the Electronic Age, should still apply, whether it's a bulletin board system, a database, or anything else."

What those modifications and qualifications turn out to be remains to be established. In the end, we have a long tradition of free speech to uphold. If we succeed, we can reap the benefits of unprecedented communications access. No one can predict the consequences if we fail. □


CentTech
PREMIUM COLOR
DISKETTES
LOWEST PRICE EVER

TIMELESS WARRANTY

SSDD
\$165*
 ea.
 5-1/4"
 QTY. 20

DSDD
\$215*
 ea.

\$230* ← 96 TPI → \$290*
 *Discounts Starting At Quantity 50 & Above

DEFINITELY COLOR-CODED DISKETTES ARE THE MOST EFFECTIVE METHOD FOR ORGANIZING YOUR DISKETTE FILES. Available in Red, Blue, Green, Yellow, Orange and many other colors. 100% error-free and backed by TIMELESS WARRANTY. Factory fresh and boxed in 10's with Tyvek sleeves, reinforced hubs, write-protect tabs and labels.

SHIPPING: Add \$3.00 per 100 diskettes or fraction thereof. Same day dispatch. VISA and Mastercard accepted. COO orders only add \$3.00 handling charges. Utah residents add 5% sales tax.

WE WILL BETTER ANY PRICE ON THE SAME PRODUCT AND QUANTITIES ADVERTISED NATIONALLY.


TOLL FREE ORDER LINE ONLY:
1-800-233-2477
INFORMATION AND INQUIRIES:
1-801-942-6717
 HOURS: 9AM-6PM, M-F (MT. STATE TIME)




2028 E. FT. UNION BLVD. #105
SALT LAKE CITY, UTAH 84121
CALL: 1-800-AFFAIRS

Inquiry 20

3M Diskettes Lifetime Warranty

Think you're getting the best price on 3M Diskettes?

You're right . . . BUT ONLY IF . . .

You're buying from
NORTH HILLS CORP.

We will beat any nationally advertised price* or give you a 15 disk library case FREE!

Call us last—TOLL FREE—for our best shot every time.

1-800-328-3472

Formatted and hard sector disks in stock.

Dealer inquiries invited. COD's and charge cards accepted. All orders shipped from stock within 24 hours. Why wait 10 days to be shipped?



North Hills Corporation

3564 Rolling View Dr.
White Bear Lake, MN 55110
MN Call Collect 1-612-770-0485

*verifiable; same product, same quantities

NEW

Monitor Mover Gives Back the Desk



\$159.95

- Models to fit most CRT's
- Rotates 360° on base
- Adjustable height
- Support tray swivels and tilts
- Holds up to 50 lbs
- Clamp, screw and wall mountings

Lintek 

P.O. Box 8056
Grand Rapids, MI 49508
(616) 241-4040

Inquiry 40

Preserve Your Copies of Popular Computing

NOW AVAILABLE: Custom-designed library files or binders in elegant blue simulated leather stamped in gold leaf.

Binders—Holds 12 issues, opens flat for easy reading. \$8.50 each, three for \$24.75, six for \$48.00 postpaid. (Add \$2.50 each for shipping outside U.S.A.)



Files—Holds 12 issues. \$6.95 each, three for \$20.00, six for \$36.00 postpaid. (Add \$2.50 each for shipping outside U.S.A.)



Mail to: Jessie Jones Industries (Since 1843),
P.O. Box 5120, Dept. POC,
Philadelphia, PA 19141

Enclosed is my check or money order for \$ _____

Please send me: _____ binders
_____ files

Name _____

Address _____

City _____

State _____ Zip _____

Note: Satisfaction guaranteed or money refunded. Allow five to six weeks for delivery in the U.S.A.

**POPULAR
COMPUTING**



COVER STORY AT&T'S MICRO WARS

Continued from page 67—

"We weren't being second-guessed as much as we might have been before," Greenbaum says gleefully of those heady days when the new machine was taking shape. "We were allowed to make decisions at the lower levels that should be made at the lower levels."

But bizarre remnants of the old AT&T superstructure forced some mystifying and seemingly unwise moves. While AT&T was streamlining procedure, it was still hampered by bureaucracy. Take, for example, the decision to use Motorola's 68010 microprocessor in the new machine.

AT&T manufactured the more powerful WE-32000, but that chip was still proprietary, not sold in the open market. The company could not use it in any product that would be manufactured externally—it couldn't release important specifications about the WE-32000 to Convergent Technologies and thus couldn't incorporate it into the new computer.

Now—unless the Unix PC is redesigned (which is unlikely, to say the least)—AT&T will be dependent upon Motorola for its central processor, a potentially costly legacy of the AT&T bureaucracy.

At the outset, the new microcomputer being developed was to be a "Unix box," one that would benefit from the multiuser, multitasking capabilities of that AT&T-owned operating system.

The decision, while predictable, created overwhelming problems. Unix was developed at the Bell Labs Computing Science Research Center in the early 1970s as an environment for professional programmers. While computer professionals find it easy to work with, it is impenetrable to newcomers, who must learn scores if not hundreds of commands that mix alphanumeric keystrokes with slashes in a most confusing way. What Unix has in its favor is the ability to sector a computer's memory, allowing a user to perform several functions concurrently. It also permits multiple users to access a single computer system through terminals, managing files in an arcane but cosmically sensible manner.

The challenge to those designing the new machine was to take the best of Unix and to lose the worst.

"If we took the Unix designed for professional programmers and tried to move it out to the workstation for the average professional to use, we'd be nuts," Edwards says bluntly.

To achieve its task, the committee agreed to give the new PC a mouse.

**THE UNIX PC
is the first
microcomputer to
make Unix easy to
use, a coup for
which its designers
will certainly get
widespread credit.**

Clicking the mouse would execute commands and functions, in a way similar to what Apple had done on its Macintosh. The group also assigned Carol Furchner, a former Princeton University psychology professor who joined Bell Labs in 1980, the job of designing an interface that would make the command structure of Unix invisible.

In the end Furchner and her colleagues created a menu-driven system that allows users to tap into the power without having to know a single Unix command. While the machine isn't the first microcomputer to use Unix, it is the first to make it accessible to neophytes, a coup for which Furchner and her colleagues will get widespread credit.

Not only did AT&T want to make a computer that was easy to use, but the company also wanted a computer that reflected its rich history as a communications empire. So in addition to designing three phone connections into the machine, the committee included in its operating system the most complete telephone capabilities ever seen on a microcomputer (see sidebar on page 66).

To complete the package, AT&T added a new Personal Terminal (for voice/data communications) and the STARLAN network to link its terminals, Unix PCs, 6300s, minicomputers, and IBM PCs through existing phone lines.

Poised for Battle

Already, AT&T has proclaimed the new machine a winner. "By taking a high-powered, pretty sophisticated piece of office gear and making it very easy to use, we have for the first time brought real power to the desk of the average office worker," says AT&T's Boyd.

But other challenges remain. So far there is little software for the machine—28 packages will be available when the Unix PC is introduced, with several more to be released within 90 days. Convergent has written a Wang-like word processor that will be bundled with the computer. Microsoft has ported its fine MS-Word product and the Multiplan spreadsheet, and Ashton-Tate is modifying its dBASE III to run on the Unix PC. AT&T also promises electronic-mail software, several business graphics and accounting packages, as well as versions of Microsoft BASIC, C, Pascal, and COBOL. Lotus, however, has no plans at this time to convert 1-2-3 and Symphony for the Unix PC.

Indeed, the AT&T Unix PC is poised to outsell Apple in the corporate marketplace, and it is also the weapon best situated to counteract IBM's PC AT. The AT&T machine, in comparable configuration, sells for several hundred dollars less than the PC AT. It also has a more powerful central processor and is potentially able to address more RAM.

But software is the AT&T machine's Achilles' heel. "Ultimately," says Boyd, "the real success of this machine will depend on the application software that is written for this system and others like it."

There are other problems. One is IBM's unquestioned dominance in the data processing departments of the Fortune 2000. AT&T has not yet gained presence in these depart-

ments, and the company's attempt to do so will be a major challenge.

Another problem, at least according to AT&T, is continued government regulation that prevents the company from competing on equal footing with IBM. For example, IBM—which faced off squarely against AT&T by acquiring Rolm—is permitted to package telephone switching services with office computers. Under current regulations, AT&T is not, although it is battling the Federal Communications Commission to rescind such restrictions.

IBM's imposing dominance, the regulatory problems, and a historical lack of AT&T marketing savvy have many convinced that no matter how good the new Unix PC is, AT&T has a long series of hard battles ahead. The company could ultimately succeed in the corporate marketplace. But that success certainly won't happen this year, and many industry observers maintain that it might not happen until the end of 1986. Right now AT&T's immediate task is just to get into the marketplace.

In Morristown, New Jersey, a man with his jacket off and his shirt-sleeves rolled could never be happy with such a small victory.

To anybody else, the odds might seem insurmountable. In a competitive environment, there is no greater foe than IBM. But James Edwards has The Power, and across the land his troops, 6000 strong, are well positioned and well armed. He dreams of better weapons and plans for ever more sophisticated products. He's forging new strategies: a promising alliance for a Unix standard in Europe, an announcement of a version of Unix for IBM machines.

In truth, more hangs in the balance than just the spoils of war. There is corporate pride, the legacy of all that AT&T once was and the promise of all it still might be. The Unix PC is a harbinger of the intense conviction with which AT&T will battle IBM for its pride.

"I think we have our act together," Edwards says, his jaw set hard, eyes afire. "We think we have a way of being very successful here, and that's what we're all about." □



dBASE

III

NEW

QUICKREPORT™

dBASE Report Generator

- Prints *any kind* of report or form
- Up to **6 databases** per report!!
- Incredibly easy to use
- No programming required

QUICKCODE III™

dBASE Program Generator

- Create CMD files *automatically*
- Data entry screens
- Data input error checking
- Computed fields & totals
- Link up to 8 databases!

Why write programs yourself?
Let QUICKCODE III do it!

dGRAPH III™

dBASE Graphics System

- Pie, line, bar charts
- Printer, plotter, or CRT
- Many automatic features

dUTIL III™

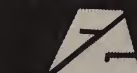
dBASE Program Utility

- Finds program errors
- Improves code
- Saves time

—Versions available for dBASE II—

INFORMATION
HOTLINE

800-221-0156

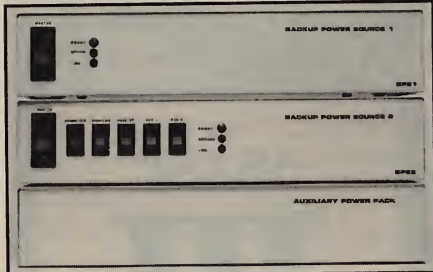


FOX & GELLER

Fox & Geller, Inc. 604 Market St., Elmwood Park, N.J. 07407

dBASE II and dBASE III are trademarks of Ashton-Tate
QUICKCODE and QUICKCODE III are trademarks of Fox & Geller, Inc.

Take control of your computer.



The Backups™

Backup power for peace of mind and memory.

Backup Power Source 1

- delivers up to 225 watts @ 120V.AC
- 40 minutes of power at 50% load
- visual and audible power interrupt alarm
- fast automatic switching
(Within 6 milliseconds of peak voltage detection)

- 2 Outlets
- AC surge suppressor
- 3 stage noise filter
- thermal output protection
- IEC power connector
- attractive metal enclosure
- 3¼" high, 16" wide, 11" deep

\$379⁹⁵ complete*

Backup Power Source 2

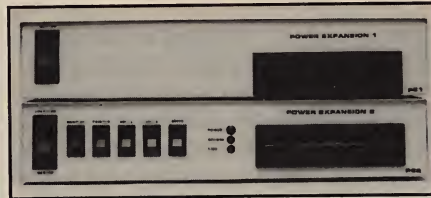
- All the features of Power Source 1 plus:
- 6 outlets controlled by front switches
 - switchable visual and audible alarm
 - 10 amp master switch circuit breaker
 - cross suppression between all 6 outlets
 - optional 2 hour auxiliary power pack

\$499⁹⁵ complete*

Auxiliary Power Pack

- 2 hours of power at full load
- plugs directly into either of our backup units
- includes 6 rechargeable 12V power cells
- backup units keep power cells at full charge
- heavy duty power cable
- 3¼" high, 16" wide, 11" deep

\$299⁹⁵ complete*



The Expanders™

Control power and expand with floppy or hard disks.

Power Expansion 1

- 1 stage noise filter
- AC surge suppression
- IEC power connector
- attractive metal enclosure
- 3¼" high, 16" wide, 11" deep
- optional internal power supply
- optional floppy and hard disk drives

Power Expansion 1 **\$149⁹⁵***

w/Internal Power Supply **\$219⁹⁵***

w/Power Supply, DS/DD Drive, All Cables and Instructions. Expands XT or Compatible **\$349⁹⁵***

w/Power Supply, Half Height 10M Hard Disk Drive, All Cables and Instructions. Expands PC or Compatible ... **\$1149⁹⁵***

20M Drive **\$1449⁹⁵***

Power Expansion 2

- All the features of Power Expansion 1 plus:
- 6 outlets controlled by front switches
 - 10 amp master switch circuit breaker
 - LED ground and line indicators
 - 3 stage noise filter
 - cross suppression between all 6 outlets
 - optional internal power supply
 - optional floppy and hard disk drives

Power Expansion 2 **\$199⁹⁵***

w/Internal Power Supply **\$269⁹⁵***

w/Power Supply, DS/DD Drive, All Cables and Instructions. Expands XT or Compatible **\$399⁹⁵***

w/Power Supply, Half Height 10M Hard Disk Drive, All Cables and Instructions. Expands PC or Compatible ... **\$1199⁹⁵***

20M Drive **\$1499⁹⁵***



The Controllers™

Control power, peripherals, spikes, and glitches.

Power Control 1

- 4 outlets control computer and 3 peripherals
- AC surge suppressor
- attractive metal enclosure
- 1¼" high, 16" wide, 10" deep

\$69⁹⁵ complete*

Power Control 2

All the features of Power Control 1 plus:

- 10 amp master switch circuit breaker
- 1 stage noise filter
- IEC power connector

\$89⁹⁵ complete*

Power Control 3

All the features of Power Control 1 & 2 plus:

- illuminated switches
- 3 stage noise filter
- cross suppression between all 4 outlets

\$129⁹⁵ complete*

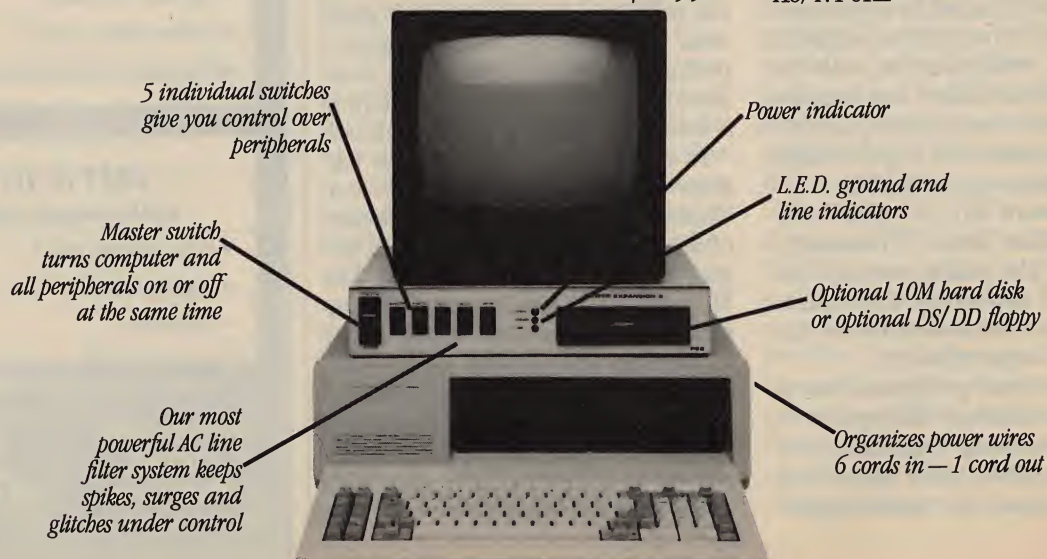
**All prices suggested retail.*

Available at fine computer stores everywhere, or by mail or phone. MasterCard and Visa accepted. Dealer inquiries invited.

Relax Technology

The company that works so you can relax and get down to business.

3101 Whipple Rd. #25
Union City, CA 94587
415/471-6112



REACTIONS

A showcase of comments, kudos, outcries, opinions, gripes, and grumblings

EPSON QX-10: SUCCESS OR FAILURE?

SCORES OF EPSON COMPUTER owners wrote in response to our February cover story, "The Rising Star of Epson," by West Coast Editor Jonathan Sacks, about the new Epson QX-16 computer and the proprietary software package Valdocs 2.0.

Many of the letter writers took offense at a single line in the article that, in explaining the history of Epson computers, said: "... the company's one desktop computer to date—the QX-10—can only be classified as a failure." Most also praised Epson's efforts to make a computer that could be used by people without any computer knowledge.

I have owned an Epson QX-10 for more than a year and have found its numerous features useful and rewarding. I am looking forward to Valdocs 2.0 to make a good computer even better. To dismiss such an excellent system as a "failure" and a "bad joke" does a disservice to your readers, potential buyers, and the microcomputer field as a whole.

STANLEY M. GOLDSTEIN
MINNEAPOLIS, MN

This kind of prejudicial doggerel has plagued Epson computers and Valdocs from the start. Does Sacks work for Big Blue?

Sacks states that the QX-10 was a failure. Perhaps in terms of market share and IBM figures this is accurate. Certainly the reliability of the QX-10 is superlative. My machine has never been down.

J. BRITTEN MILLER JR.
WALESKA, GA

As a QX-10 owner since September 1983, I would like to know what Sacks has in mind when he says the QX-10 is a failure. Does he mean it is a commercial failure... it hasn't sold very well? That might be, and too bad for the market. But if he means that it is a failure as a machine, he is simply wrong. It is a splendid computer—and that goes for its maligned Valdocs, too.

J. DAVID SAPIR
CHARLOTTESVILLE, VA

It seems to be a fad for computer industry insiders to denigrate the Epson QX-10 hardware and Valdocs software. The Epson QX/Valdocs package is just too good and too easy for real people to use, to satisfy the ego-tripping hackers.

J. C. TREAGER
GENERAL MANAGER
LIMBACH AIRCRAFT ENGINES
TULSA, OK

I have owned my QX-10 since October 1983 and... have used it in various ways in over a year's time with absolutely no regrets and, incidentally no repairs.

Valdocs is, granted, slow; however, its ease of use far outweighs its slowness for those of us who do our thinking at the keyboard. In spite of its slowness, Valdocs saves me time as it leaves me free to think about my reports and records rather than how to make the computer work.

JO MURPHY HYLAND
VENTURA, CA

I have been satisfied with Chris Rutkowski's efforts with the original Valdocs and appreciate the improvements with each new release. Epson has upgraded at no charge to the original owners.

I find that Valdocs is far easier to

use than the word-processing software that comes with the \$8000 Data General computer in our office. No codes to memorize, no computer jargon to muddle over with Valdocs.

BOB LINDBORG
GREAT FALLS, MT

... Mr. Sacks writes that Epson officials "in ignoring the lessons of history [seem] doomed to repeat their embarrassing failures." Given a more realistic perspective, he might well have written instead, "The Epson QX-16 is a further step in the evolution of what may be the most usable word-processing instrument in the business."

NIEL GLIXON
GREAT NECK, NY

As a technically oriented, noncomputer-literate consultant, frustrated in repeated attempts to join the computer revolution, I was attracted to the QX-10 by its advertised operational simplicity. Despite occasional problems due to my inexperience, I was soon able to perform all of the functions for which I had purchased the system.

However, as I progressed in applying my new capabilities... I became impatient with the slowness of Valdocs functions. Though sales personnel acknowledged the Valdocs limitations at the outset, they assured me that improved versions would soon be provided... One year later, however, local dealers were unable to be specific about the availability of improved Valdocs. My letters to Epson America seeking information on this matter and advice about occasional glitches have been ignored.

If there is a failure here, and there is, it is the failure of Epson America and its dealers to provide after-sales

READER FEEDBACK

Listed below are the articles in this issue with corresponding article numbers, page, and author references. To rate an article as Excellent, Good, Fair, or Poor, circle the appropriate number on the Reader Feedback portion of the Reader Service card.

PAGE	ARTICLE	ARTICLE #
11	NEWS	1
20	TELECOMPUTING	2
22	MARKETPLACE	3
30	BUSINESS	4
36	AT LARGE	5
38	COMPUTER JOURNAL	6
46	MICRO REVOLUTION	7
52	MILLER'S TIME	8
59	THE TECHNOKLUTZ	9
62	AT&T ESCALATES THE MICRO WARS	10
68	LAPTOP COMPUTERS	11
73	NEW PORTABLE DISPLAYS	12
76	AT RISK: YOUR ON-LINE FREEDOM	13
82	QUADRAM DATAVIEW 25	14
86	NEC STARLET	15
90	NCR PC4	16
96	HUSH 80 & EPSON P-80	17
100	PG EXPANSION RAM	18
104	BUSINESS SERIES FOR THE MACINTOSH	19
111	CORNERSTONE	20
117	SIMPLY PERFECT	21
120	XYWRITE II PLUS	22
123	DIGITAL PAINTBRUSH	23
127	BOOK REVIEWS	24
130	ASK POPULAR	25

RESULTS FOR MARCH

Our contributing editors pulled a coup in the March issue. Four of the top five rated articles were regular monthly columns, according to our Reader Feedback. Ask Popular, which has been inching steadily up the popularity ladder for months, finally took the gold.

1. ASK POPULAR
Ciarcia, Weiner
2. RANDOM ACCESS
Various Authors
3. COMPAQ DESKTOP
Summers
4. BOOK REVIEWS
Nicita, Petruska, Hinshaw
5. MICRO JOURNAL
Levy

REACTIONS LETTERS

support to a very fine product, the QX-10.

E.W. NORRIS
SAN ANTONIO, TX

The QX-10 is a failure.

It is a failure in the marketplace, having captured less than a one percent marketshare since its introduction. And it is a failure as a computer because it has never fulfilled its promised potential. That doesn't mean the computer doesn't have a fine screen or a wonderful keyboard (as I noted in the article). It doesn't mean there aren't good reasons for liking it. It just means that as a marketable product, it is doomed (which is why Epson is replacing it with the QX-16).

As I write this, Valdocs 2.0 remains unavailable. So, too, does the QX-16. When I called Epson America, they told me the release date for both was now "early spring." Maybe by the time you read this, both will be here—late again.

It's nice to see that Epson has some loyal users. I, too, am an Epson QX-10 owner (I bought mine shortly after the machine was released), and I differ from many of you who wrote letters only in that I no longer buy off on Epson's promises. The company has repeatedly failed to deliver, and it has repeatedly failed to respond to the demands of an ever-more sophisticated market. And that's very sad.

I don't deny that the QX-10 and Valdocs 1.18 (the last dependable released version) are easy to use and even usable, and those of you who love the computer have every right to defend it.

But the market has changed radically since the development of the QX-10 and Valdocs. Simply put, the world has passed it by. It is a Model T in a world of Porsches, without, of course, the value of antiquity.

Chris Rutkowski's was a noble effort that has reached an ignoble end. I join with all who praise him for trying and hope that he refocuses his boundless energies and continues his quest to make computers accessible to the masses.

Valdocs 2.0 and the Epson QX-16, however, hold little promise. The

package adds up to too much (money), too little (power), too late. The new Epson machine—unless its price is radically lower than proposed—deserves to die an ignominious death. Let us hope that in the future Epson will use its vast resources to develop a machine that matters.

—J.S.

MBC-555 Book Address

In our February review of the Sanyo MBC-555, author Terrance Geary opened a can of worms when he mentioned Fred Zurofsky's book *MBC-555 Series Personal Computer Handbook*, which, Geary points out, fills in the information gaps and corrects the errors that pepper Sanyo's User's Guide. Owners rushed to their bookstores, only to be further frustrated by retailers who couldn't obtain Zurofsky's book. Fred Zurofsky has supplied us with forms to order the book from him, or you can write directly to Computer User Services, 230 Anderson St., Hackensack, NJ 07601; (201) 343-2590.

Correction

In our March cover story on Money Management Software, we printed a chart of mid-range management software packages with icons representing the features of each. However, a paste-up error resulted in an incorrect listing of features for the last two packages. The two lines of icons were combined and inserted next to the BPI Personal Accounting package, leaving a yawning blank space next to the PC/PFP II and PC/Tax Cut packages. BPI Personal Accounting actually has only check-book balancing, check writing, and budgeting capabilities, while PC/PFP II and PC/Tax Cut have all those as well as graphics and income tax adjuncts.

We welcome your feedback—via letters to the editor, opinion articles, and electronic mail—on articles we've published and on the personal computing field in general. We will pay at least \$100 for any letter or article (750 words maximum) that we publish on the Opinion page. Address paper mail to Reactions, Popular Computing, POB 397, Hancock, NH 03449. Address electronic mail to ST6604 on The Source, or to "Popular Computing" on Participate on The Source, or to 70045, 1320 on CompuServe.

Computer Air Filters

For Apple, Adam, Atari, Commodore, IBM, Kaypro, Tandy and many more!

Don't Let DUST Collect Inside Your Computer!
Protect your investment and reduce the chances for costly service.



Kits cut to size easily!

KIT #1 Will supply the Apple II, II+, IIe for over a year.
KIT #1 For Apple II, II+, IIe, IIC, Adam, Atari XL600, XL800; Commodore 64, VIC 20; IBM PC, Kaypro 2/4.
Includes: 1 - 72" Self Adhesive Velcro
1 - 12" x 60" Filter Material **Only \$10.50**

KIT #2 For Apple, Macintosh, IBM PC Jr.
Includes: 1 - 108" Self Adhesive Velcro
1 - 16" x 60" Filter Material **Only \$12.50**

If your computer is not mentioned, measure the outside diameter of all the grills on your computer and order the kit that fits your needs.

Extra Self Adhesive Velcro \$3.00/yd.

Refill Air Filter Material for Kits #1 and #2

Refill #1 1 - 12" x 60" Filter Material **Only \$7.75**

Refill #2 1 - 16" x 60" Filter Material **Only \$9.25**

Add \$1.75 postage and handling for any size order.

Wisconsin res. add 5% tax.

Send check or money order to:

Computer Air Filter Co. P.O. Box 972 Racine, WI 53405

Inquiry 21

Is your computer worth \$50.00?



COMPU-FIRE™

20 oz. Halon 1211
Microcomputer
Fire Extinguisher

For printers & peripherals too
Made in USA - UL rating 2B:C
No mess - clean & safe
No CO2 static to zap data
No powder to corrode boards
Chrome plated DOT steel cylinder
Metal valve with pressure gauge
Height 10 in., weight 2 1/4 lbs.
Rechargeable locally or by us
5 year warranty!

Send \$50 ck, MO, VISA, MC.
Includes Shipping & Handling.
PA residents add \$3 sales tax.
Dealer inquiries welcome.

PROTECTALL CORP.
5422-F Page Drive
Pittsburgh, PA 15236
(412) 882-0114

Data Protection Since 1970

Inquiry 52

Subscription Problems?

If you have a problem with your POPULAR COMPUTING subscription, write us with the details. We'll do our best to set it right. But we must have the name, address, and zip of the subscription (new and old address, if it's a change of address). If the problem involves a payment, be sure to include copies of the credit card statement, or front and back of cancelled checks. Include a "business hours" phone number.

POPULAR COMPUTING
Subscriber Service
P.O. Box 388
Hancock, NH 05449

5 Year Warranty
SAVE 50% ON
Verbatim Datalife
Diskettes

SPECIAL DISKETTE OFFER

Verbatim Datalife Disks have 6 data-shielding improvements for greater disk durability and longer data life.

PLUS! If you call, write, or utilize reader service in response to this ad—we'll send you our full-range catalog of computer supplies with Special Offers good for further savings on Verbatim diskettes and many other quality products.

Call or write for our discount catalog.

LYBEN COMPUTER SYSTEMS

1250-E Rankin Dr., Troy, MI 48063
Phone: (313) 589-3440

DATALIFE - THE NAME IS THE PROMISE
THE WARRANTY IS THE PROOF

Inquiry 43

System Sidekick gives back the desk



Dealer Inquiries Welcome

\$79.95

- Frees up desk
- Keeps drives in easy reach
- Can't tip over
- Holds drives off floor away from dirt
- Clamps or screws at side of desk

Lintek
Computer Accessories
P.O. Box 8056
Grand Rapids, MI
(616) 241-4040

Inquiry 41

CONVERSE WITH YOUR COMPUTER

AT LAST! A FULL IMPLEMENTATION of the original ELIZA program is now available to run on your microcomputer!

Created at MIT in 1966, ELIZA has become the world's most celebrated artificial intelligence demonstration program. ELIZA is a non-directive psychotherapist who analyzes each statement as you type it in and then responds with her own comment or question—and her remarks are often amazingly appropriate!

Designed to run on a large mainframe, ELIZA has never before been available to personal computer users except in greatly stripped down versions lacking the sophistication which made the original program so fascinating.

Now, our new microcomputer version possessing the FULL power and range of expression of the original is being offered at the introductory price of only \$25. And if you want to find out how she does it for teach her to do more, we will include the complete SOURCE PROGRAM for only \$20 additional.

Order your copy of ELIZA today and you'll never again wonder how to respond when you hear someone say, "Okay, let's see what this computer of yours can actually do!"

ELIZA IS AVAILABLE IN THE FOLLOWING FORMATS:

- 1 5 1/4 inch disk for the 48K Apple II, II Plus, IIe or IIC
\$25 for Protected Version—\$45 for Applesoft Source Version
- 2 5 1/4 inch disk for the 64K IBM Personal Computer
\$25 for Protected Version—\$45 for IBM Disk BASIC Source Version
- 3 5 1/4 inch disk or tape cassette for the Commodore 64 (specify which)
\$25 for Protected Version—\$45 for C-64 BASIC Source Version
- 4 Standard 8 inch single density disk for all CP/M based computers
\$25 for ELIZA COM—\$45 with Microsoft BASIC-80 Source
- 5 5 1/4 inch disk for most CP/M based computers (specify computer)
\$25 for ELIZA COM—\$45 with Microsoft BASIC-80 Source

Please add \$2.00 shipping and handling to all orders
(California residents please add 6% sales tax)

ARTIFICIAL INTELLIGENCE RESEARCH GROUP

821 North La Jolla Avenue, Dept. 0
Los Angeles, CA 90046
(213) 656-7368 (213) 654-2214
MC, VISA and checks accepted

Inquiry 10

maxell DISKS

LIFETIME WARRANTY

Think you're getting the best price on Maxell Diskettes?

You're right . . . BUT ONLY IF . . .

You're buying from
NORTH HILLS CORP.

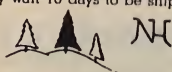
We will beat any nationally advertised price* or give you a 15 disk library case FREE!

Call us last—TOLL FREE—for our best shot every time.

1-800-328-3472

Formatted and hard sector disks in stock.

Dealer inquiries invited. COD's and charge cards accepted. All orders shipped from stock within 24 hours. Why wait 10 days to be shipped?



North Hills Corporation

3564 Rolling View Dr.
White Bear Lake, MN 55110
MN Call Collect 1-612-770-0485

*verifiable; same product, same quantities



Your floppy disk should be a
BASF Flexydisk®

5 1/4" SINGLE SIDE DOUBLE DENSITY SOFT SECTOR **\$1 39**
5 1/4" DOUBLE SIDE DOUBLE DENSITY SOFT SECTOR **\$1 69**
SOLD IN BOXES OF TEN ONLY **\$3 59**
3 1/2" SINGLE SIDE
SOLD IN BOXES OF FIVE ONLY

tremendous selection of software books, accessories and supplies

UP TO 50% OFF!

Software for IBM PC

dBase III	349	Multimate	269
Framework	349	Symphony	419
Home Acct. Plus	89	Wordstar 2000	279
w/Ultratile	149	Wordstar Pro Pac	249

ABOVE SOFTWARE AVAILABLE IN OTHER FORMATS. CALL FOR AVAILABILITY AND PRICE.
Minimum shipping and handling \$2.00. California residents add 6% sales tax.
Prices subject to change without notice. Write for our free catalog.

ABC data products

3311 ADAMS AVE, SAN DIEGO, CA 92116

619-283-5488 800-854-1555

Inquiry 4

A Public Service of This Magazine & The Advertising Council

Give till it helps.



Red Cross is counting on you.

It Isn't Easy

There was a riot at my office yesterday. I think I'm partly to blame, although I didn't mean to incite a riot. I thought we were happily making our agency a leader in the application of new technology.

I should back up to explain that I work for a fairly small government agency that finally allowed itself the luxury of hiring one computer person—me. The other people in the office are civil engineers, economists, and sociologists. Being well versed in mainframe use, I was not very excited when personal computers started to arrive, a few at a time, in the office. Enthusiasm was high, though, because everyone thought the new machines would be easy to use and fun, too.

All micros are not alike, of course, least of all the ones in our office. Some have 64K bytes on the motherboard, others have 256K bytes. Two of our machines were purchased before double-sided drives were available, so now we have four machines, each with one double- and one single-sided drive. It's a little confusing that the single drives are on the right in two of the machines and on the left in the other two, but they *are* marked.

Four machines are currently sharing a Corvus hard disk. These machines, of course, must run DOS 1.1 until we get the DOS 2.0 Corvus upgrade. The newer machines all have STB multifunction boards, but three of the older computers have AST boards and my machine has a

A small mob of frustrated users opens a computer specialist's eyes



Quad board. You just have to remember what you can and can't do where, right? It's easy!

Or at least so I thought. But a storm was brewing while I was busily downloading mainframe creations, zipping them into Personal Editor for surgery, whipping them through Lotus 1-2-3 for finishing touches, and producing wonderful plots on my HP-7470A (with option 001). Bombarded with questions, I fired off more questions:

"What do you mean your file is gone? What did you do? You copied the file onto another disk? That's no problem. You used *DISKCOPY*!!"

"What? Your document has a big gap in the middle? You took it to my machine to print it and made some last-minute changes? But my machine was running under 1.1 and you created your document on a disk formatted for 2.0!"

"What do you mean your disk is no good? That's a single-sided drive you're putting a double-sided floppy in!"

As my patience waned, so did the thoroughness of my answers: "Look at the screen—it tells you what to do . . . Read the documentation . . . Ask Tom, Dick, or Harry."

And I guess I didn't do much better with the "how do you do this" questions: "It's easy! Just strip off the control characters with the Wordstar-to-DOS translator, then use Crosstalk to send it to the word-processing center. Oh, and if you use the Datakit instead of the Hayes, you can transfer at 4800 baud."

I didn't notice the faint hum in the distance until it became a chant. The words became clearer as the words got closer: "It isn't easy. *It isn't easy!* IT ISN'T EASY! IT ISN'T EASY!"

When the air cleared, I recognized some sobering facts about human beings and computers. Not everyone, it seems, can learn to use microcomputers easily or even wants to. Most people would learn faster, too, if all the hardware and peripherals were the same.

I also realized that on-screen tutorials can't react to high anxiety levels. Employees should be trained by people, not floppy disks.

And when the hum in the distance becomes a chant, get a key and lock your door!

—MARILYN V. FLEMING

Marilyn V. Fleming has been a computer professional with the U.S. Army Corps of Engineers for 13 years.

Fanatic At Work



"I never pictured myself as a personal computer fanatic, but I found a reason to become one—ThinkTank™

I use it every day. It's my 'status center' where I log every important fact, plan and meeting.

Last month I used ThinkTank to manage my way around a crisis. A key engineer quit, leaving us short-handed at a bad time. I worked late that night, had two meetings the next morning and arrived at an action plan by mid-afternoon. Without ThinkTank it would have taken twice as long and I would have been half as confident.

I don't need a personal computer to make me a better typist, for calculating budgets or entering invoices. These are good reasons for other people to use a personal computer. ThinkTank is the reason I use a personal computer."

One toll-free call to 1-800-822-3700 (in California, 1-800-443-4310) will guide you to the nearest dealer.

THINKTANK™




The First Idea Processor

Inquiry 69

ThinkTank outline processing software is available for IBM Personal Computers and 100% compatibles, with 256K or more, Texas Instruments Professional and Pro-Lite Computers (\$195); in two versions for Apple Macintosh, ThinkTank 128 (\$145), ThinkTank 512 (\$245); and for the Apple II family (\$150).

"ThinkTank" and "The First Idea Processor" are trademarks of Living Videotext, Inc. IBM is a trademark of International Business Machines, Inc. Texas Instruments Professional and Pro-Lite Computers are trademarks of Texas Instruments, Inc. Macintosh is a trademark licensed to Apple Computer, Inc. Apple is a trademark of Apple Computer, Inc.

© Copyright 1985, Living Videotext, Inc., 2432 Charleston Road, Mountain View, CA 94043 (415) 954 6300



**IT'S
ONLY
4½ LBS.**

**The Tandy 200 is the
one portable for all.**

Meet the new generation of portable computing—more built-in software, a flip-up 40 × 16 screen and larger memory. Our exclusive 40-column LCD means bigger, clearer text and less eyestrain. All this in a system that's 21¼ × 11¾ × 8½" and is battery powered.

**Comes with Six
Programs Built-In—
Including Multiplan**

For complex spreadsheet analysis and calculations, we put popular Multiplan software into Tandy 200's permanent memory. Now it's easier than ever to do budgeting, P&L projections, sales forecasts, pricing, engineering calculations and more. Five other "instant-on" programs let you use the Tandy 200 for word processing,

**AND
RARING
TO GO!**

as a personal appointment calendar, address and phone directory and telephone auto-dialer. You can even write your own programs in the BASIC language, too.

Adopt One Today!

Step up to the powerful software and impressive capabilities of the Tandy 200 portable computer for just \$999

(26-3860). Best of all, the Tandy 200 represents the state of the art in performance, quality and price. Stop by your local Radio Shack Computer Center, or participating Radio Shack store or dealer and "size it up" today!

Radio Shack®
The Technology Store™

A DIVISION OF TANDY CORPORATION

Inquiry 53

Prices apply at Radio Shack Computer Centers and at participating Radio Shack stores and dealers. Multiplan/TM Microsoft Corp.

